291
9-77

HR. 1294

ANE-3086-1

MASTER

The Institutional Aspects of the Energy Centers Concept

March 1977

By A Panel of
The National Academy of Public Administration

For the
Energy Research & Development Administration
Division of Nuclear Research & Applications

Contract No. Ex-76-C-16-3086

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research and Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

Available from:

National Technical Information Service (NTIS)
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

Price: Printed Copy: $10,00
Microfiche: $ 3.00

ANE-3086-1
UC-2

The Institutional Aspects of the Energy Centers Concept

March 1977

By A Panel of
The National Academy of Public Administration

NOTICE
This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research and Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

For the
Energy Research & Development Administration
Division of Nuclear Research & Applications

Contract No. Ex-76-C-16-3086

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

FOREWORD

This study is part of a continuing inquiry by the National Academy of Public Administration into the institutional aspects of the complex and diverse set of problems bearing the label of energy in one form or another. The Academy's study program is based on recognition that technological approaches to the solution of energy problems are highly dependent upon the effective working of our institutions. Those institutions, in both the public and the private sector, must mesh together far more efficiently than they have in the past if we are to find our way to an acceptable energy future.

Far too often the search for technical solutions to contemporary problems, whether in the energy field or in other public policy arenas, is conducted without reference to social, political and economic considerations. Yet technology, as a neutral force, can create problems as well as resolve them. To assure that technically oriented research and development is managed along lines compatible with the public interest, it will be necessary to devote increasing attention to the nexus of technology and the institutions of our society.

This report on the institutional aspects of the energy centers concept is the product of a panel organized under the auspices of the Academy. The collective effort which went into this study involved not only the collegial participation of the Academy panel but also the coordination and general support provided by Academy staff, and the contributions of consultants to the panel.

I would like to take this occasion to express my gratitute to all those who participated in this endeavor. The chairman of the panel, William E. Warne, brought to this and the earlier related studies under his direction the wisdom and experience gained during his distinguished career in energy, natural resource and environmental affairs. The panel members contributed a range of insights based on perspectives reflecting their varied backgrounds. All of the panelists played an active role in seeking to fulfill the assignment of the two sponsoring agencies, the Energy Research and Development Administration and the Federal Energy Administration.

Erasmus H. Kloman, Senior Research Associate of the Academy, served as staff director for this study, coordinating the work of the panel and the sev-

eral consultants to it. As Executive Secretary of the Academy's Standing Committee on Environmental and Resource Management, Dr. Kloman has directed all of the Academy staff activity in the subject areas relevant to the energy centers study.

The consultants made an invaluable contribution to the work of the panel throughout the duration of the investigation. Each prepared papers which were reviewed by the panel. The consultants were Robert Brenner, Woodrow Wilson School of Public and International Affairs, Princeton University; Terry A. Ferrar, Pennsylvania State University; and Orval Hansen, Attorney. Fred Clagett of the Office of Community Development, Office of the Governor, Olympia, Washington, who served in the capacity as a panel observer, prepared the paper on the state of Washington.

Finally, I would like to thank the two sponsor agencies and the contract monitors, Messrs. William Savage of Energy Research and Development Administration and Alexander Bastos of the Federal Energy Administration, who provided useful guidance and full cooperation in furthering the work of the panel.

George H. Esser
Executive Director

THE INSTITUTIONAL ASPECTS OF THE ENERGY CENTERS CONCEPT

TABLE OF CONTENTS

		Page
	FOREWORD	
I.	SUMMARY	
	A. Introduction	1
	B. Findings and Recommendations	5
	C. Energy Centers Panel List	19
II.	SOCIOECONOMIC IMPACTS OF NUCLEAR ENERGY CENTERS	20
	A. Introduction	21
	B. Overview of Nuclear Center Social and Economic Impacts	22
	C. Uncontrolled Rapid Growth--The Boom-Bust Cycle	44
	D. Community and Regional Development Issues	50
	E. Implications and NEC Technical Choices	58
	F. The Role of Planning	61
III.	NUCLEAR ENERGY CENTERS: EQUITY CONSIDERATIONS RELATING TO TAXATION AND REVENUE DISTRIBUTION	89
	A. Executive Summary	90
	B. Chapter I--The Implications of the Pennsylvania Energy Parks Controversy for the Nuclear Energy Center Concept	94
	C. Chapter II--Utility Tax Revenue and Distribution Programs: Case Studies of Three States	109
	D. Chapter III--Taxation Policies and Public of Equity	132
	E. Chapter IV--Policy Recommendations: the Need for Realism and Flexibility	146
IV.	REPORT ON JURISDICTIONAL AUTHORITIES OF STATE AND LOCAL GOVERNMENT RELATED TO CENTRALIZED AND DECENTRALIZED ALTERNATIVE ENERGY SYSTEMS	157

TABLE OF CONTENTS
(Cont'd)

Page

A. Introduction. 159

B. The Nuclear Energy Center Site Survey (NECSS-75). 162

C. Statutory Authorities 164

D. Powerplant Siting 166

E. Co-ordinated Utility Planning 168

F. Federal Regulation. 170

G. Decentralized Energy Systems. 172

H. Emerging Jurisdictional Conflicts in Powerplant Siting. . 175

I. Summary 182

V. FEDERAL-STATE CONFLICTS AND COOPERATION IN THE SITING OF NUCLEAR ENERGY FACILITIES 195

A. Introduction. 195

B. Constitutional and Statutory Foundations of Federal and State Authority 196

C. Emerging State Authorities. 201

D. Emerging State-Federal Conflicts. 212

E. Mechanisms for Cooperation. 216

F. Conclusions and Recommendations 221

VI. THE ENERGY PARK EXPERIENCE IN PENNSYLVANIA. 228

A. Abstract. 229

B. Text. 230

C. Appendices. 257

D. References. 265

Page

VI. (Cont'd) THE NATURE OF PUBLIC REACTION TO ENERGY PARKS . . . 266

A. Organizational Note 267

B. The Nature of Public Reaction to Energy Parks: Some Examples 268

C. The Opposition. 270

D. The Support 280

E. Attachments 284

VII. ENERGY CENTERS IN WASHINGTON STATE: A SOCIOECONOMIC INSTITUTIONS SUMMARY. 266

A. Introduction. 267

B. Energy Resource Planning in the Northwest 271

C. Regional (Interstate) Issues 281

D. Regional Governmental Organization. 284

E. Electrical Energy Base of Washington State. 292

F. Energy Facility Site Evaluation Council 296
(formerly Thermal Power Plant Site Evaluation Council)

G. State/Local Relationships in Siting 303

H. Taxation of Electric Generation 308

I. Hanford as an Energy Center 316

J. Roosevelt Energy Center 319

K. Socioeconomic Research Needs. 320

L. Bibliography 322

INTRODUCTION

Study Objective: The energy centers panel was formed for the purpose of investigating the institutional problems associated with the implementation of energy centers. The mandate to the panel called for emphasis on intergovernmental relations and sociopolitical issues and the development of recommendations for actions (legislative or other) to solve such problems. A major part of the assignment was to examine the experience in two states where the energy center concept has been actively considered. The states of Pennsylvania and Washington were selected by the panel for this analysis.

Methodology: The methodological approach taken in this study was similar to that followed in the earlier Academy study of energy parks undertaken by the Academy for General Electric Company's Center for Energy Systems which had received a study grant from the National Science Foundation. That study was completed in May, 1975. Several of the members who had served on the previous panel also served on the second panel. A number of consultants were engaged to prepare papers on assigned topics for the panel's review and to provide supplementary support to the Academy staff. William E. Warne, the Chairman of the Academy Standing Committee on Environmental and Resource Management, served as Chairman of both panels. Erasmus H. Kloman, a Senior Research Associate of the Academy served as Project Director and Panel Secretary for both studies. The names of the panel members and consultants are indicated on the list attached at Appendix A.

The panel met for four two-day meetings over the course of the twelve month period of the energy centers study. At these meetings the panel deliberated on the broad questions relevant to the panel assignment

and also reviewed and criticized the drafts of the several papers prepared by the consultants as background for the panel.

While the individually signed papers that follow reflect the comments of the panel, responsibility for their content rests with the authors. No attempt has been made to achieve panel consensus on these papers. On the other hand, the summary of findings and conclusions which follows does represent a panel consensus. This consensus does not imply that every member of the panel accepts in detail every position taken in the summary. Care has been taken, however, to draft this statement in language that corresponds as closely as possible with the views of the majority of the panel membership.

Concept Definition: The assignment to the panel called for investigation of a concept for future energy development. Over a period of years, since its origins in the work directed by Dr. Alvin Weinberg at Oak Ridge National Laboratories in the late 60's, the concept has undergone numerous mutations. Even the terminology has changed with the concepts. Weinberg referred first to nuclear energy centers; the terms energy farms and energy parks gained currency; now the terminology has shifted back to energy centers.

For the 1975 energy parks study, GE chose as a reference either 20 nuclear (light water reactors) or 24 fossil units with a total generating capacity of approximately 26,000 MWE. A different reference point was taken in the 1975 Nuclear Energy Center Site Survey conducted by the Nuclear Regulatory Commission. They considered three types of centers: (1) power plant centers of ten to 40 units; (2) fuel cycle centers, and (3) combined centers containing both power plants and fuel cycle facilities.

On the basis of its assessment of the practical prospects of the centers concept and the reactions to the earlier studies, the panel modified its definition for the purposes of its deliberations. It defined as a center any planned development of more than four nuclear power plants along with some fuel cycle facilities.

The panel interpreted its mandate broadly, however, and did not confine its deliberations to a rigid or arbitrary definition of the concept of energy centers. The matters of concern to the panel, namely the institutional issues associated with the development of a large energy complex, have broad relevance in today's world, whether the complex is nuclear or fossil fired, whether it includes or does not include fuel cycle facilities, even whether it is planned or unplanned. The choices involved in deciding how, where, and what kind of center to develop are all critical. But these questions are all part of a broader set of institutional issues encompassing public administration and intergovernmental relations with respect to energy siting and development. Indeed, as in the study of energy parks for GE, one of the constantly recurring aspects of this panel's investigation was the evidence that many institutional problems inherent in developing energy centers also occur in dispersed siting. As the summary of findings indicates in many places, this panel's deliberations are pertinent to a broad range of energy planning and development questions.

Scope of Study: The panel's study focused primarily on the institutional issues associated with the concept of energy centers as compared with various alternative approaches. As a reading of the background papers will reveal, these institutional issues were far-ranging. The investiga-

tion did not, however, attempt to deal with many of the complex technical questions which continue to be reviewed in a number of other studies sponsored by ERDA, FEA, and NRC. No detailed attention was given to the technical aspects of environmental effects, heat release questions, or the safeguards advantages inherent in the concentration of generating and fuel cycle facilities in one location. These are all matters that have been and are being subjected to review in other investigations. The panel took cognizance of this related work during its deliberations.

The following statement of findings and recommendations reflects not only the substance of the papers prepared for the panel, but also the panel's perceptions of issues relevant to the concept of energy centers in an environment subject to rapid and dramatic shifts of public policy and public opinion.

FINDINGS AND RECOMMENDATIONS

The objective of this study, to analyze the institutional aspects of the energy centers concept, is inextricably linked with the larger problems of planning, siting and licensing the overall mix of energy facilities to supply national energy needs. A significant fact impinging on the study of energy centers is the range of institutional inhibitions confronting all kinds of energy facility development, particularly nuclear power plants. The rate of new orders for individual nuclear plants has slowed to the lowest level in some 20 years during the period of this study assignment. The causes of this slowdown tend to be more of an institutional or socio/political nature than technological, though the two types of cause are obviously interdependent. In a sense, the problems associated with development of dispersed nuclear power sites are magnified in the consideration of energy centers. A climate conducive to the continued development of nuclear power as one of the nation's energy options is evidently a prerequisite to serious consideration of the concept of nuclear energy centers.

During the past year in which this study has been under way, the future of nuclear power has become increasingly clouded. The surprisingly decisive defeat of the six state nuclear initiatives in November, following the defeat of the California initiative in June, is interpreted in some quarters as a signal of a trend towards public acceptance of nuclear power. A Roper poll showing 70% popular support for further nuclear development conforms with the trend indicated in the state initiatives. On the other hand, a Harris poll conducted in July 1976 found a slippage in public support from 63 to 61%. More significant than the slight erosion in public support is the extent to which the support is hedged by reservations. Many of those endorsing nuclear power do so reluctantly, viewing the option only as the lesser of various evils.

Meanwhile, the opposition of the committed anti-nuclear opponents seems unlikely to abate. Certainly, there are no grounds for predicting that the defeat of the six state initiatives will clear the way for unimpeded nuclear development.

There is abundant evidence of continuing and intensive public concern over particular aspects of nuclear energy such as possible diversion of plutonium, the safety of facilities, and the disposal of radioactive waste. No one contends that the development of nuclear power is devoid of risks or that the nation's nuclear policy should be developed without recognizing the serious implications of the choices involved. Under these condi-

tions opponents of nuclear power will seek to arouse further public opposition and utilize any available procedural devices to slow or block further nuclear development.

Another development occurring in the course of the panel's investigation which bears on the outlook for nuclear power is the appearance of a number of long range energy growth studies predicting or advocating significantly lower growth scenarios than those that had been commonly accepted until recently. One of these studies, entitled "Economic and Environmental Implications of a U.S. Nuclear Moratorium" has estimated electricity projections considerably lower than historical growth rates and estimates of previous analyses. This study was conducted by the Institute for Energy Analysis at Oak Ridge under the direction of Alvin Weinberg, who, as we noted above, originated the concept of energy centers.

The Institute study assesses the impact of a thirty year nuclear moratorium with no new construction starts after 1980 but assuming continued operation of reactors on line by 1985. By that year nuclear power would account for more than 20 percent of the nation's electricity supply. The study does not recommend for or against such a moratorium, and Weinberg has made public his opposition to a cutting off of the nation's nuclear capability. Even with low energy growth, enormous pressure would be placed on the supply of coal which would have to be produced at the rate of 1.5 to 2.6 billion tons annually by the year 2000 to replace the cutback from the nuclear source. Whether or not the nation can tolerate the environmental, health and safety impacts of tripling or quadrupling the supply of coal is debatable.

The findings of the Oak Ridge study with respect to lower energy growth projections parallel in some respects the interim report of the National Research Council Committee on Nuclear and Alternative Energy Systems. One of the approaches employed in this study is the development of several energy growth scenarios, though the report states "the study will not recommend any one scenario as the most desirable course of future change, nor will it designate a most probable scenario." At another point, however, the report asserts that "A number of factors make it likely that total demand for energy will grow at a lower rate in the future than historical growth, and that such lower growth is desirable and possible without detriment to other possible social goals."

Other low growth projections have been advanced in such earlier studies as the Ford Energy Policy Project study A Time to Choose and in the various publications of Amory B. Lovins including Non-nuclear Futures: The Case for an Ethical Energy Strategy, coauthored by John H. Price.

All who are concerned about the nation's energy future would have to endorse the objective of holding energy growth to the lowest level consistent with a fully-employed and prosperous society. There can be no argument against vigorous energy conservation programs far more effective than any achieved to date. There is likewise no argument against efforts to eliminate the waste and inefficiency in our present energy system.

The fact is, however, that these low growth projections are appearing at the very time when the nation is experiencing the highest weekly rates of electricity demand in our history. This high demand rate is attributable to severe weather conditions, but there is no assurance of more moderate weather patterns in the future.

Those who are advancing lower than historical energy growth projections factor in a variety of considerations such as lower fertility rates with consequent lower population growth, increased costs of energy, increased emphasis on conservation, lower participation rate in the work force, and changes in life style. Meanwhile other analysts in Federal energy agencies and in industry are observing that the rate of growth for electricity demand in 1976 had climbed back up to over 6%. A continuing growth rate of 5% is widely predicted. The reserves of electric power capacity, while they were relatively high during the recession years, are now in danger of dropping below safe levels in several parts of the country. The Federal Power Commission warns against the danger of regional electricity shortages as a distinct possibility in the 1979-1985 period.

Demand growth projections are notoriously difficult to make, even for relatively short term periods. Projections looking ahead to a more distant future are even more susceptible of error since the effect of error is magnified over time. Electric energy growth patterns are likely to be widely different among regions of the country. Some regions may require considerable additions to generating capacity to accommodate economic growth.

Even though nuclear power now represents a relatively small share of total energy supply, or even of total electric supply, there are some parts of the country where the nuclear share of electricity supply is substantial, ranging up to 50%. But many of the plants planned or under construction are either being cancelled or delayed. Just as there are problems with the development of the nuclear option, so are there numerous unresolved problems with all of the non-nuclear options. Environmental impacts, rising cost, and, in the case of the newer technologies, the uncertainty of their potential for commercial competitiveness all point to the need for caution in relying on these sources of energy in the near to mid-term future.

A danger lurking in projections that anticipate a nuclear moratorium several years ahead is the possibility that the nuclear industry may begin

to phase out sooner rather than later. Equipment manufacturers now find the field marginal at best. Utility firms are increasingly reluctant to take on the disputes involved in the development of a nuclear facility. The low growth scenarios could have the unexpected self-fulfilling side effect of bringing nuclear development to a standstill well before the 1890-85 time frame. The nuclear option has been compared to an insurance policy to cover the contingency of energy shortages for both the mid-term and long-term futures. The alternative is continuing primary reliance on combustion of fossil fuels, and on still experimental technologies of uncertain future value and importance. A question that calls for serious consideration is whether the U.S. can afford to risk the imminent loss of the nuclear option.

* *

1. The concept of energy centers merits a higher priority than it is accorded in discussion of national energy policy and programs.

The investigations conducted by the panel bear out the view, expressed in the earlier Academy study of energy parks, that the positive advantages of the energy centers concept are too significant to be neglected, as they have been for the most part, in current energy policy deliberations. The highly controversial nature of the nuclear power issue has had the effect of undercutting any public consideration of nuclear energy centers. Environmental opposition to fossil fuel based technologies, particularly coal, has likewise prevented fruitful discussion of collocation of fossil facilities. But, despite the uncertain future for further development of nuclear power, if not indeed because of this uncertainty, the concept of nuclear centers should receive more serious consideration as an energy policy option.

A number of the major objections raised by opponents of nuclear power might be met, at least in part, by the planned development of nuclear centers. Some environmental impacts could be more readily contained and isolated than with dispersed siting. Impacts on the host community could be ameliorated by planning for extended development. Security problems would be more readily managed through the collocation of facilities. Indeed, one of the most powerful arguments for the centers concept may come to bear, not in connection with the present generation of nuclear technology, but as an answer to the difficult safeguards problems posed when and if there is a commitment to a plutonium-based technology.

Nevertheless, the centers concept will obviously not satisfy nuclear opponents. More likely, it will attract their fire as a new and highly visible target. The concept should be presented, however, as one way of developing the nuclear option with full regard for the legitimate concerns of the environmentalists.

2. The trend of recent years towards clustering of nuclear plants favored by a number of utilities is likely to continue. To the extent that energy centers (in contrast with incremental clustering) are developed, comprehensive planning on the part of both utilities and government agencies becomes an increasingly important function.

If nuclear power is to be retained as one of the nation's energy options, there will be a number of pressures forcing utilities to continue the present practice of locating generating plants in clusters. Physical limitations, either shortage of available land sites or limited supplies of water, dictate clustering in most regions of the country. For this reason, utilities have tended increasingly to collocate their power plants in clusters of two, three and four units, in effect a "mini center" complex. Although these clusters are not designated as centers, they represent a close approximation.

The planned development of power plants by TVA could, in fact, be regarded as one approach to siting that embodies the main elements of the centers concept. But TVA and the Hanford complex discussed below, are not representative of the rest of the nation's electric energy supply system. The utility industry has shown relatively little interest in the energy centers concept. What interest they have displayed has mostly tended more towards opposition than support. Yet, the clustering of nuclear power reactors is, in a sense, a back-door approach to the centers concept. As such, however, it misses out on one of the principal advantages of the centers concept, namely the benefit of comprehensive planning of an integrated center from the inception of the project through a staged progression of development.

The several advantages of the center concept all hinge to some extent on taking a planned approach to the development of an energy facility. The present practice of clustering obviously entails a substantial degree of planning on the part of the utility companies responsible for meeting future demand in their service areas. But this planning tends to be technically oriented, protected behind proprietary bounds, and disconnected from general land use planning in the public sector.

The possibility of cost savings to be achieved through standardization, the minimizing of adverse socioeconomic impacts, the stabilization of a labor force, the limiting of environmental pollution, the ability to serve multi-state regional service areas--all of

these potential benefits depend on precisely the kind of coherent and interrelated (public/private) planning which is missing from the incremental and ad hoc decision making that now prevails.

In today's economic environment, the raising of capital for any generating plant is difficult. There is now a greater incentive for joint financing by utilities in order to spread the high costs of new investment. Implementation of the energy center concept would be likely to entail joint ventures.

3. Although the implementation of the energy centers concept is peculiarly dependent on comprehensive planning, any rational energy development will require more coherent planning at all levels of government. Intergovernmental relationships need strengthening for this purpose.

Calls for more and better planning are commonplace among the plethora of studies competing for attention in governmental bureaucracies. Adding one more voice to this chorus may seem a somewhat futile exercise. Nevertheless, the need for facing this necessity cannot be ignored. Moreover, there are indications that the time may be ripe for progress on this front. Prospects for the passage of Federal legislation for land use planning will probably improve in the present Congress. Only a few states have begun to develop land use planning capability with an attendant ability to transform plans into action. However, Federal legislation providing incentives for state land use planning will be a positive step in the right direction. At the state level, furthermore, there are numerous encouraging signs that the need for more effective planning is at least recognized.

The kinds of institutional problems posed by siting of energy facilities, whether dispersed or centers, nuclear or non-nuclear, are forcing a recognition of the need for a better meshing together of the planning efforts of the several levels of government.

4. Regulatory and licensing reform, needed in any case for more rational development of nuclear power sites, is essential to the realization of the energy center concept.

At present, it would be difficult if not impossible to lieense a site for a center of many more than four units. A number

of different features in the present licensing system preclude such action. They include: lack of generally accepted criteria for siting four or more nuclear power stations at a single location; lack of criteria for siting of associated fuel cycles; lack of institutional capability and flexibility on the part of Federal and state regulatory agencies to permit independent decisions on siting separately from consideration of the amount of power needed at the moment; lack of a coordinated Federal-state reviewing process that would allow for a unified decision; the licensing uncertainties which increase the front-end capital risks to the extent that attempts to license a center become an imprudent, if not impossible, investment in the future; and the inadequate attention given in state siting decisions to assessing the ultimate carrying capacity of proposed sites for multi-unit facilities.

5. Lessons of Two Case Studies

A. Pennsylvania - The Pennsylvania energy parks experience holds many lessons for all concerned with the institutions and processes for reaching rational energy decisions. While the sponsors of the energy parks concept embarked on their enterprise with the best intentions for planning ahead, exposing their plans to full and open public discussion, and minimizing adverse environmental and socio-economic effects, their effort was undermined by a combination of factors including the absence of a state level energy plan, lack of state governmental support for the effort, an insufficiently comprehensive site selection process that failed to reckon with the probabilities of public opposition, and a public input meeting process that preluded a balanced debate or a fair representation of community opinion.

The energy park development effort in Pennsylvania failed to achieve fruition not on the basis of full and fair debate on the issues of parks vs. dispersed siting, but, at least in part, because such debate was foreclosed. The public debate was used as a forum for the opponents of nuclear power. The paper detailing this case history makes clear that the concept of energy parks was not advanced in ways that would assure balanced and rational discussion focused on the most logical selection of sites. On the contrary, the Pennsylvania energy park group and the Governor's Energy Council, which sponsored the public hearings throughout the state, employed an approach that

precluded the possibility of rational public discussion of the basic issues. The public meetings were so organized and structured that the question of parks vs. dispersed siting was submerged by the attacks against nuclear power.

The Pennsylvania energy parks experience illustrates the need for comprehensive and broadly based criteria as the basis for community based decision making relative to siting energy facilities. Such criteria should take into account both the interests of immediately impacted areas and of larger areas anticipating growth in energy demand.

As it now stands, the energy parks concept has been so widely and vociferously rejected in Pennsylvania that it has almost no chance of being revived, although it is one of several siting approaches being studied by a joint committee of the state legislature. The original organizers of the energy park group still maintain that land and water restrictions will ultimately dictate park or center siting as the only viable course for Pennsylvania. Because of the liklihood that Pennsylvania energy planners will fail to come to grips with the real issues, it appears that the movement in the direction of a center will occur on an evolutionary basis without the benefit of rational consideration of long-range socio-economic and other institutional concerns.

B. Washington - Washington, which has a state one-stop permit process, has accepted what may be described as a center in incipient form. The complex of nuclear facilities at the Hanford reservation is being developed with some support from that part of the community which has enjoyed the past benefits of jobs and income. Older residents, however, tend to resent the influx of new construction workers. Although further development of Hanford as a full scale center remains an uncertainty, the experience to date underscores the feasibility of implementing the energy center concept.

The second state selected for study, Washington, was chosen because of the presence there of the complex of nuclear facilities at Hanford, a Federal reservation. This complex represents one of the closest approximations to an energy center, as defined by the panel, in being. The Hanford experience with nuclear power goes back to the beginnings of U.S. involvement in nuclear power. People in the Tri-

city area bordering the reservation accept and even welcome the Hanford complex for the economic benefits it provides. But the Hanford site is not without its social and economic problems. Local government jurisdictions have become concerned about increased financial burdens caused by the installation of three nuclear plants under construction under two Federal and state licensing certificates. The Washington Public Power Supply System, the operating utility, has agreed to honor claims from taxing districts for compensation for such burdens. A report prepared for 14 of these local jurisdictions assesses these impacts and proposes a timing schedule for impact reimbursement. The utility has issued its first assessment of the socio-economic impacts as required by its state site certification agreement for two of the three plants.

The panel concentrated its attention primarily on the Hanford site in Washington, but also took note of the possibility of a multi-unit site development by Pacific Power and Light of Portland. PP&L is considering a number of potential sites for its next generating facility which will probably consist of at least two coal-fired power plants. One of the locations under consideration is a tract of land acquired by PP&L at Roosevelt on the Columbia River where studies have indicated favorable conditions for a mix of nuclear and coal fired plants. No decision has yet been made to build coal or nuclear plants on a definite schedule for the site. The fact that PP&L is considering this approach to siting, however, conforms with the point under item 2 above concerning the trend towards clustering.

6. Planners and policymakers should look upon the centers concept as an opportunity to advance towards more rational and better defined regional economic growth. Higher priority should be assigned to the development of an adequate methodology for socio-economic impact assessment.

Two major goals of the energy center planning process should be to flatten "the build-up curve" and to encourage steady and permanent, as opposed to temporary, development. This minimizing of the disruptive effect of large construction projects can be achieved only through governmental, community and developer cooperation in the planning stage. Such planning should include assessment of the most desirable scheduling or phasing of unit construction and the total makeup of the several types of facilities composing a center.

With adequate advance planning it is possible to provide community infrastructure, including housing, transportation, schools and

other public and private services, that will serve local residents and the center workforce far better than typical boom-town development. This kind of approach to the planning and development of centers would maximize the prospects for identifying communities that would opt for center development. Another way to maximize this prospect is to select as potential sites military reservations which have been or are about to be abandoned.

The federal government should assume some responsibility for and funding of socio-economic impact mitigation. A socio-economic impact mitigation plan should be a required part of environmental impact statements. There should also be a Federal loan program to assist communities in preparing for a center induced growth. If a planned project is cancelled after a community has invested in preparation for future growth, a "forgiveness clause" in the loan would free the community of its obligations.

A very serious weakness in socio-economic impact assessment is the inadequacy of methodologies. Economic base (i.e. multiplier) models have not been developed to the state where they can be used for analyzing the longterm regional impacts of energy projects on dynamic social and economic conditions. High priority should be assigned to the further development of such methodologies.

7. The arguments for greater emphasis on the energy center concept lend support to the cause for stepping up R&D funding for long distance transmission technology.

The limitations of natural resources needed to support the generation of electricity, particularly water and land, tend to drive the siting of large aggregations of plants towards areas where these resources are most readily assembled. Such areas are themselves scarce and often distant from projected load centers. The availability of a transmission technology enabling the power industry to develop these areas, regardless of their location, could ease many of the siting problems in supplying metropolitan centers. Thus current institutional problems associated with the energy center concept, because of the premium they place on remote locations combined with natural resource availability, reinforce the argument for research for improved long distance transmission technology.

8. The study of the equity considerations relating to utility taxation and revenue distribution in Pennsylvania, New Jersey and New York leads to the following three major conclusions.

a) The utility taxation and revenue distribution programs in these three states differ distinctly both in terms of administrative design and ultimate net revenue flows.

b) The inherent inequities associated with energy facility construction and operation tend to be accentuated by present utility tax-revenue distribution schemes; and

c) The construction and operation of a nuclear energy center in these states would intensify the already severe inequities that persist for dispersed energy facility construction and operation.

9. There is no single pattern of energy development that will suit all parts of the nation. If nuclear centers are developed, they will be most suited for serving densely populated and heavily industrial service areas. Another concept that deserves full consideration is the decentralized facility. Decentralized facilities and smaller plants may be more suitable for certain types of locations and should not be precluded by nuclear center development.

The electric utility industry is generally subject to both state regulation which was developed in relation to the public needs and jurisdictional boundaries of state and local governments, and federal regulations which have frequently been inconsistent or in direct conflict with state regulatory interests.

Changes in the technology of electric generation, transmission, and distribution have resulted in the expansion of the electric utility industry to the point where the service areas determined by

corporate interests may supersede the political jurisdictions and geographic boundaries of state and local governments.

Decentralized energy options provide planning alternatives to state and local governments which may affect zoning, land-use planning, economic growth, and taxation, in comparison with proposed electric energy centers.

While decentralized energy options may involve as many institutional problems as energy centers, unlike electric energy centers in general and nuclear energy centers in particular, they are inherently more compatible with the jurisdictional authorities of state and local government.

10. Efforts to move ahead in a rational program of energy development have been stalemated too long. Such a concept as the energy center is ignored or shunted aside, in large part, because of confusion concerning the locus of governmental responsibility. Several executive agencies are interested, but no lead responsibility has been designated.

A first order of priority for moving on the several recommendations presented in the preceding pages is the assignment of lead agency responsibility for further exploration and possible development of the potential represented in the energy center concept. During the course of this assignment, Federal interest in energy centers has been shared by ERDA, FEA and NRC. When and if an energy reorganization results in a consolidated department for energy affairs, that department would evidently have lead agency responsibility for further pursuit of the energy centers concept.

11. To avoid federal-state conflicts in the siting, licensing and regulation of nuclear facilities and to permit timely decisions to be made will require the enactment of federal legislation which provides for greater state involvement and clearly defines the areas of state and federal jurisdiction. The most effective approach, however controversial from a political viewpoint,

would be legislation that pre-empts to the federal government authority to regulate the siting, licensing, construction and operation of nuclear facilities in all areas relating to public health and safety and that delegates back to the states broad regulatory authority to be exercised on a regional basis through interstate compacts approved by Congress.

Both the federal government and the states have jurisdiction over some aspects of the siting, licensing and regulation of nuclear energy facilities. Under the authority granted to it by the Atomic Energy Act, the federal government has played a dominant role in the siting of nuclear power plants. It exercises pre-emptive authority over radiological health and safety matters.

In contrast to earlier years when states seemed willing to yield to federal authority, the states have recently become increasingly active in asserting jurisdiction over nuclear and other energy facilities. State actions have taken the form of laws approved by their legislatures and propositions placed on the ballot to be decided by the voters.

Some of the initiatives are clearly unconstitutional because they assert authority to regulate in areas that have been pre-empted by the federal government. Litigation is not a satisfactory solution to these conflicts, however, because of the resulting confusion, uncertainty and delay and because court defeats would almost certainly increase state pressure for the passage of federal legislation enlarging state authority.

A growing number of states, however, are passing laws relating to the siting and regulation of energy facilities that probably are constitutional and well within the area where states have properly and traditionally exercised jurisdiction. In many respects these state laws overlap, duplicate and conflict with provisions of federal laws. The continuation of this proliferation of state legislation will confront an applicant for a license to build a nuclear power plant with the necessity to make separate applications with a state and the federal government which may be subject to public hearings at both levels and to submit to continuing regulation by state and federal authority under requirements that may be in direct conflict.

To avoid these conflicts and to permit timely decisions to be made will require the passage of federal legislation providing for

greater state involvement in decisions and regulation. More and more evidence points to the need for a framework which precisely defines the lines of legal authority between the states and the federal government. The most practical and probably the only way this can be accomplished is through federal legislation establishing regional organizations in which the states can speak with a strong voice but will be incapable individually of frustrating regional decisions. In the absence of a such a regional structure constitutional questions relating to the balance between federal and state authority will remain to be solved by consensus or in the courts on a case-by-case basis. Neither of these avenues offers a realistic prospect for an effective decision-making process.

Such a regional organization could be established by federal legislation along the following lines:

1. Congress would pre-empt to the federal government the regulation of the siting, licensing, construction and operation of nuclear facilities, in all matters relating to public health and safety including environmental factors and those socio-economic factors that are included in the preparation of environmental impact statements.

2. The power thus pre-empted would be subject to a qualified delegation to the states acting collectively on a regional basis through interstate compacts approved by Congress. The boundaries of the regions would be defined in the federal legislation and the delegated power would be exercised through a regional power facility regulatory administration.

3. The regional power facility regulatory administrations would be federal regulatory instrumentalities, subject to applicable federal statutes governing hearings, procedures and judicial appeals. They would exercise within the respective regions and within the limitations of their jurisdiction certain functions now exercised by the NRC and responsibilities under NEPA as well as those assigned to the states under the Federal Water Pollution Control Act and the Federal Water Quality Act.

4. Governors of the states within a region would appoint state representatives to the regional organization whose responsibilities may include making recommendations with respect to regional power needs and for state legislation making adjustments among the states for tax inequities and other matters arising out of decisions on plant siting. Certain large states might have the combination and land mass to qualify as regions.

Energy Centers Panel List
Observers and Consultants

Energy Centers Panel

James H. Baroff
The Energy Center

Harold B. Finger
Center for Energy Systems
General Electric Company

Gerald Garvey
Woodrow Wilson School of Public
and International Affairs
Princeton University

Joseph A. Lieberman
Nuclear Safety Associates

Marc Messing
Environmental Policy Center

Richard A. Mulford
Philadelphia Electric Co.

Irving Spiewak
Oak Ridge National Laboratory

Joseph Swidler
Attorney

Arvin E. Upton
Attorney

William E. Warne
Consultant, Panel Chairman

Erasmus H. Kloman, Panel Secretary
National Academy of Public
Administration

Observers

James L. Sundquist
The Brookings Institution

Malcolm Ernst
U. S. Nuclear Regulatory Commission

Fred Clagett
Office of Community Development
Office of the Governor
Olympia, Washington

William B. Harral
Governor's Energy Council
Harrisburg, Pennsylvania

Contract Monitors

William Savage
Energy Research and Development
Administration

Alexander Bastos
Federal Energy Administration

Consultants

Robert Brenner
Woodrow Wilson School of Public
and International Affairs
Princeotn University

Terry A. Ferrar
Pennsylvania State University

Orval Hansen
Attorney

SOCIOECONOMIC IMPACTS OF NUCLEAR ENERGY CENTERS

by Robert D. Brenner
Woodrow Wilson School
Princeton, New Jersey 08540

Page

INTRODUCTION 21

OVERVIEW OF NUCLEAR ENERGY CENTER SOCIAL AND ECONOMIC IMPACTS. 22
- Primary Impacts
- Multiplier Concept
  - Economic base theory
  - Factors which influence the Multiplier
- Secondary Impacts
  - Relocation
  - Land use and values
  - Local economy
  - Housing
  - Provision of services
  - Transportation and congestion
  - Taxation
  - Social conflict

UNCONTROLLED RAPID GROWTH--THE BOOM-BUST CYCLE 44
- The Boom Town
- Bust Problems

COMMUNITY AND REGIONAL DEVELOPMENT ISSUES. 50
- Origin of Workers and Commuting Patterns
- New Communities Versus Expanding Existing Population Centers
- Balance Between Regions and Communities Withing Regions
- NEC Development Decisions Which Influence the Extent of Further Economic Development

IMPLICATIONS OF NEC TECHNICAL CHOICES. 58
- Buffer and Low Population Zones
- Construction Rates
- Colocation of Fuel Facilities

THE ROLE OF PLANNING 61
- Growth Management
- Social Impact Assessment
- Structural Differentiation
- Governmental Responsibilities
  - Local
  - State
  - Federal

FOOTNOTES. 73

BIBLIOGRAPHY 84

INTRODUCTION

Concern over the socioeconomic impacts of large projects on nearby communities is relatively new in American public policy. The traditional inattention to external or secondary effects reflected policymakers' generally unequivocal support of economic growth.

Significant segments of the American public no longer unquestioningly support economic growth. At minimum, growth must now meet various "standards of quality" -- standards which vary among groups and individuals. The more frequently promoted guidelines include: the minimization of environmental degradation, "equity" in the distribution of benefits, and protection of the rights of self-determination for the individuals and communities involved.

The applicability of these concerns to nuclear energy center planning is immediate and apparent. The social and economic impacts which could be associated with the establishment of such facilities must be understood, publicized in the locale of the proposed development, and effectively managed.

Environmental concern is now focused on much more than "Nature." The concept has been extended to include the present and future prospects for communities' viability -- the "quality of life". Therefore just as energy facility plans are frequently modified in order to minimuze their negative ecological effects; energy center planners must be sensitive to the social and economic impacts on surrounding areas resulting from technical decisions. Socioeconomic considerations may even compel modification of an energy center's size, location, or components.

This paper is based on intensive study of the existing nuclear energy

center and socioeconomic impact literature. It begins by summarizing the probable initial impacts of NEC construction on the surrounding region -- the number of construction workers and permanent operating and maintenance employees which can be expected, and the timing of their appearances. The major emphasis of the study is providing an overview of the secondary or, more descriptively, "ripple" effects of energy center construction -- impacts on the surrounding region's population, economy, land use patterns, social and institutional structures, and public services.

The study then explores the factors (primarily decisions made in the NEC-planning and initial implementation process) which influence the magnitudes of these effects, and canvasses policy alternatives which authorities have proposed for effectively managing socioeconomic impacts. The importance of advance planning, and the respective roles of local, state, and federal authorities, will receive special attention

OVERVIEW OF NUCLEAR ENERGY CENTER SOCIAL AND ECONOMIC IMPACTS

Primary Impacts

There is general agreement among analysts regarding the probable size of nuclear center construction and operating forces. The variation among projections is not sufficient to alter the conclusions of this study. Therefore the "guideline" figures which will be used are the estimates of the Nuclear Regulatory Commission, publicized in Nuclear Energy Center Site Survey -- 1975 (NECSS-75).[1]

Although at one point forty-unit energy centers with colocated fuel-cycle

facilities were considered to be feasible, subsequent studies prepared for the NRC have indicated that 20 units with fuel facilities provide a more likely upper bound. The graphs on the following page indicate the manpower requirements of eight potential types of nuclear energy centers.

There are several important observations which can be gleaned from the graphs:

1. the peak manpower requirements do not differ greatly between ten and twenty unit centers

2. colocation of fuel facilities tends to extend the duration of the peak employment period

3. two unit starts per year results in far more pronounced, (i.e. more rapid rate of both build-up and decline) employment peaks, of considerably greater magnitudes, than those associated with initiating work on just one new unit each year.

These findings are important because subsequent analyses will show that the amount of new employment created is less important than the duration of the peak. The character of a large project's socioeconomic impacts depends on the quality of local responses to it. Communities have greater incentives to react positively to long-term economic changes than to temporary booms. The degree of permanency associated with the increase in economic activity is therefore a major determinant of the socioeconomic impacts' severity.

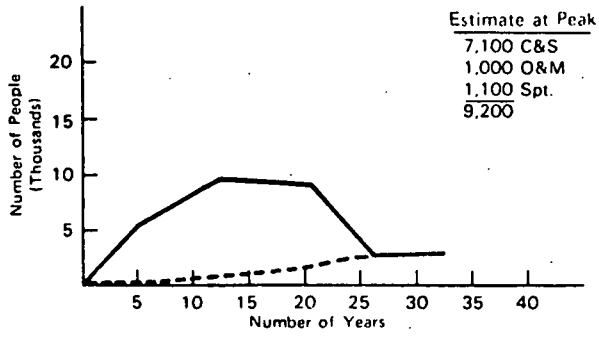
The Multiplier Concept

The multiplier concept represents an effort to quantify the ripple (i.e., induced) effect on an economy of an economic stimulus. It is frequently used by economists to estimate the total impact of a project on regional income and employment.

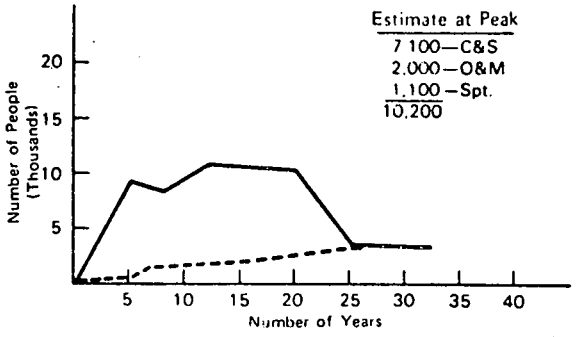
The general formula for the income multiplier is:

ONE UNIT START PER YEAR

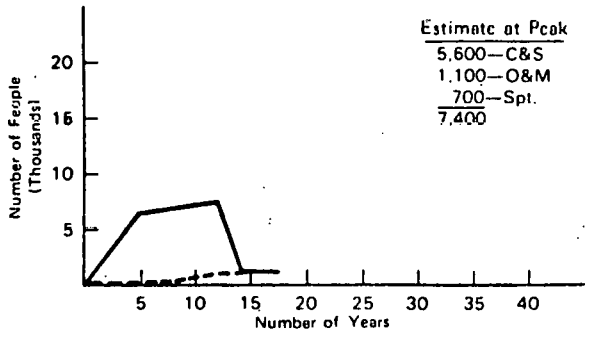
20-UNIT POWER CENTER



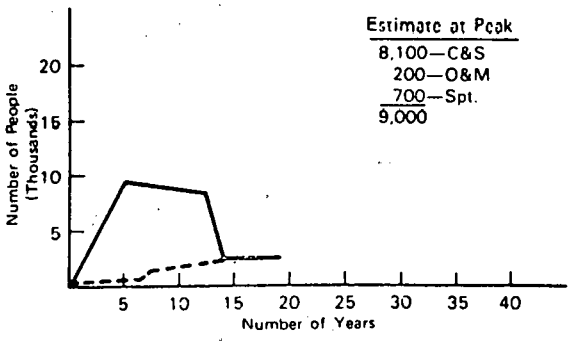
20-UNIT POWER CENTER + COLLOCATED FUEL CYCLE FACILITY (CFCF)



10-UNIT POWER CENTER



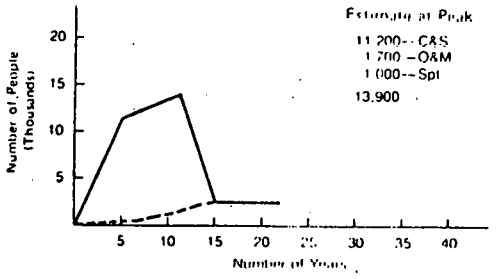
10-UNIT POWER CENTER + COLLOCATED FUEL CYCLE FACILITIES (CFCF)



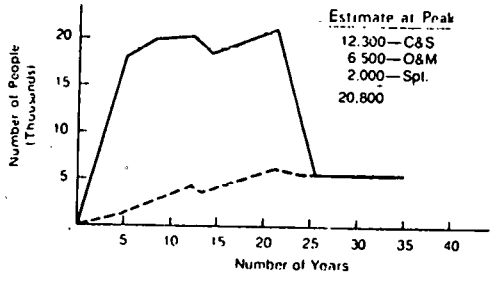
Note C&S – Construction and Supervision.
O&M – Operation and Maintenance.
Spt. – Support - additional engineering, central fabricating facilities, central administration and security forces.

TWO UNIT STARTS PER YEAR

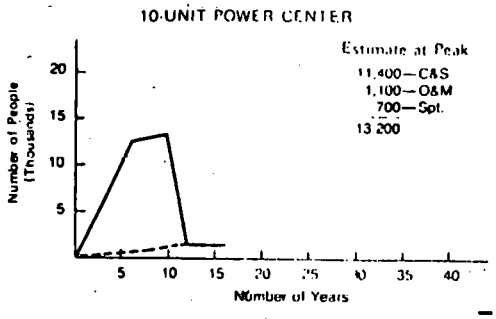
20-UNIT POWER CENTER



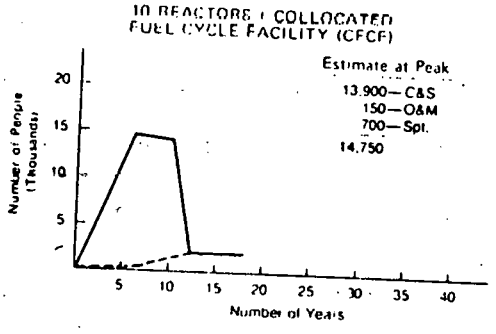
20-UNIT POWER CENTER + COLLOCATED FUEL CYCLE FACILITY (CFCF)



10-UNIT POWER CENTER



10 REACTORS + COLLOCATED FUEL CYCLE FACILITY (CFCF)



$$\frac{1}{\text{1-fraction of added income spent on local goods and services}} \times \text{fraction of consumer scale which become local income}$$

Employment multipliers are determined by (i) calculating the ratio of basic to service employment in a region. That part which produces for and caters to the local market is classified as service activity. That part which produces for (is oriented to) the regional, national and world markets is classified as basic. (ii) the ratio of changes in total employment to changes in basic employment over a recent period of time is the regional employment multiplier.[3] It indicates the number of "spin-off" jobs generated by a large project.

Once the total (primary and induced) number of jobs created by a large project are estimated, the resultant regional population increase can also be approximated by using national averages for family sizes and numbers of workers per family.

Variations of this Keynesian demand approach to estimating economic impacts have been used in almost all nuclear energy center studies to date. The size of the multiplier, as would be expected, varies according to the characteristics (such as size and population density) of the region under study.

Income multipliers tend to be relatively low because of leakages to commercial entities located outside the region, and federal and state government (in the form of income and payroll taxes). They are rarely estimated to be greater than 1.5. Employment multipliers range from 2 to 2.5. Finally,

the population multiplier associated with the construction and operation force of an energy center is estimated to be about five, assuming 1.5 secondary workers entering the region per primary employee and 2 dependents per new worker.

Using these multipliers, a sparsely-populated region impacted by a 20-unit plus colocated fuel facility nuclear energy center could expect:

1. a "net regional income" increase of $180,000,000 per year
2. an employment increase of 15,000 jobs (only 2/3 of the peak NEC construction and operating peak job force is assumed to be sufficiently long-lasting to initiate a multiplier effect.)
3. a population rise of 45,000.

Weaknesses of Economic Base Theory

Multiplier methodologies are grounded in economic base theory, occasionally coupled with input-output analysis. However the theories are not directly applicable to long-term situations -- particularly the lengthy period required to construct an energy center.

The quality of economic base predictions deteriorates rapidly when there is sufficient time for qualitative changes to occur in social, technological and economic conditions within the region.[4] A new energy center would cause exactly these types of changes -- the massive influx of newcomers would transform the region's social structure while the construction of new industry and public infrastructure facilities would alter the region's technical and economic structure.

Factors Which Influence the Multiplier

The factors which significantly affect the size of the multiplier include public attitudes, manpower training programs, and the state of public infra-

structure facilities. All of these characteristics are to a great extent determined by public policy decisions. The multiplier predictions should therefore be viewed as rough indicators -- a "best guess" as to what will occur in the absence of forceful local, state, or federal responses to the influx of economic activity.

But for a project the size of an NEC, which is so large as to overwhelm most regional economies, the estimates must be viewed as little more than guesses. Planners would be mistaken to lock themselves into these predictions. Instead, they should be aware of ways in which policy decisions will alter the size of the multiplier -- i.e., reinforce or restrict the region's economic expansion.

Secondary Impacts

The crux of the socioeconomic impact problem is that individual communities must cope with rapid population build-ups. The concept of absorption is key to understanding the socioeconomic impact process. Large communities are generally less hard-pressed to absorb new residents than smaller communities, simply because they have a large base -- changes in lifestyles resulting from accommodating the newcomers are less noticeable.

A few small communities though are also capable of effectively accommodating a large addition to their population. As Havighurst notes, these tend to be in areas which have experienced previous intensive industrial activity and subsequently declined. These communities frequently have available underutilized housing stock, commercial, industrial and transportation facilities, and public services such as sewage treatment and education programs.[5] Perhaps equally as important, they have the collective experience of dealing with

rapid growth -- an invaluable advantage, particularly since they are likely to appreciate the importance of advance planning.

The specific number of people which a community located near an energy center site would need to accommodate can only be estimated on a site-specific basis. It would depend on its proximity not only to the NEC, but also to other communities, available infrastructure, size of the work force, and other related considerations. However the general problem remains: what are the characteristics of rapid growth and how can they be handled. The following sections of this study will delineate those effects. For reference purposes, the consequences of rapid growth often, but not invariably appear when a non-urban community attempts to accommodate population increases greater than ten per cent per year.[6]

The problems of rapid growth and the mechanics for managing it will be applicable to all cities and towns located within commuting distance of an energy center and can be described in generic terms. Again, it is not the magnitude of the impacts which is important so much as the degree of permanency ascribed to the new population level. An important characteristic of nuclear energy centers is that the new population levels associated with their erection falls into the "twilight zone" between temporary and permanent. A small energy center constructed very rapidly causes a brief (e.g., seven year) increase in population, whereas a large center built at a slow rate (one unit started per year) would be responsible for a twenty to twenty-five year jump in the population level with a relatively small subsequent decline. For all practical purposes this situation would be considered permanent in terms of community planning. The facilities built in response to the new-

comers would therefore be more carefully planned and designed and of considerably more substantial quality than those erected for a short-term population build-up.

Relocation

A major initial impact of energy center construction will be the need to relocate those citizens located in the area selected to be a center site. This is the most visible of many significant land use changes which will undoubtedly occur.

A twenty unit nuclear energy center with colocated fuel facilities will require a site of approximately sixty square miles.[7] Even in sparsely populated areas a sizeable number of people would need to be relocated. Judging from existing NEC candidate area studies the number could range from four thousand to eight thousand people. There is also the likelihood that many commercial establishments and possibly whole communities would be uprooted.

It is difficult to over-emphasize the severity of the social and economic impacts resulting from such disruptions. North Carolina University's Institute for Research in Social Science presented a succint overview of the problem:

> Relocation disrupts normal activity in earning a living among the people to be moved. Persons whose livelihood has been derived from farming, lumbering, or other direct use of natural resources of the area to be taken, face actual separation from the economic base. Likewise, merchants, manufacturers, and professionals such as lawyers and doctors must relocate their equipment and activities and not uncommonly they are confronted with dispersal of both labor force and clientele.
>
> In situations where whole communities are to be removed from an area, most formal and informal associational groupings are subjected to severe stress, and may dissolve. If most of the residents of a

> community decide to relocate as a group, it is possible for many of the mutual dependency and mutual aid customs to serve during the difficult days of the move. If, on the other hand, no such decision is made, then families work out their plans individually and relatively few community patterns of mutual assistance continue to function. Neither the local government nor other organizations can exercise a leadership role when the upheaval of relocation fractures communities into small groups or individual families which disperse both physically and interest-wise. In such situations new leadership may emerge; the land-speculator or the real estate development agent may exert far more influence on where people relocate than the community's former leaders, who become immersed in their own personal relocation problems.[8]

If families try to relocate near the NEC site they are likely to be confronted by a market with rapidly escalating prices -- prices higher than they received for their property.[9]

The following imperatives must be met if the negative social effects of relocation are to be minimized:[10]

1. adequate compensation for property-owners, for those forced to move and for business operators who suffer damages to their livelihood.

2. assistance to control inflation of nearby land values and to encourage group purchase of land (to preserve community ties)

3. relocation counseling services

The severe social disruptions and the high costs of compensation which characterize the relocation process are powerful reasons for minimizing its use. Therefore energy center planners should pay careful attention to the possibility of utilizing abandoned, or soon-to-be-abandoned, military reservations as sites. Such locations would also facilitate provision of the required housing and public services.

Another intriguing possibility that would minimize the need for relocation is to use NEC exclusion area requirements to protect ecologically fragile (largely unpopulated) areas. For example, Maryland has considered

acquiring the "Still Pond Neck Site" on the state's Eastern Shore for a future nuclear facility. Local residents have requested that the site be considered as a means to prevent companies from mining peat and humus within Big Marsh which would fall within the facility's exclusion zone.[11]

Land Use and Values

As new entities enter an area and bid for limited space, land prices will rise. The construction of an energy center would clearly spur such increases in the areas surrounding the site. Realty speculators and zoning decisions which limit land availability for commercial and residential use are likely to reinforce this tendency. However the sizeable potential area for fringe development associated with an NEC and its exclusion area (a perimeter of perhaps thirty to fifty miles) reduces the pressures on any given development center.[12]

Nevertheless, to the extent that land prices do rise, a difficult problem will result. The rising land values will cause increases in housing costs. Land-intensive industries such as farming and lumbering will be endangered as a result of being out-bid by new economic activities not only for land, but for laborers.

Rights-of-way would be required for the transmission lines emanating from a nuclear energy center. Early attention should be paid to the possibility of multi-use purposes for these long corridors of land. For example, maintenance paths could be adopted for the use of bicycles, snowmobiles, and other off-the-road vehicles.

Local Economy

Construction of a large-scale energy complex could generate numerous

beneficial impacts on nearby local economies. There would probably be a broad spectrum of new employment opportunities for local workers, a dramatic increase in the area's tax base; and significant increases in retail trade, service activity, and the local economic base through the attraction of industrial development.[13]

Business in the region will enjoy increased sales for two reasons: first, contractors at the site will buy a part of their materials and supplies from local businesses; second, construction workers will spend part of their income on local products and services. The businesses most likely to be patronized by NEC contractors are those supplying materials too heavy to be readily shipped long distances, such as sand, gravel, lumber and cement.[14]

Commercial establishments which are likely to benefit from the increase in retail trade include grocery stores, restaurants, gas stations, mobile home dealers and some automobile dealers. However, since the newcomers to the area are likely to possess different backgrounds and tastes from the existing populations, and new establishments will rapidly appear, local retail merchants may require assistance in upgrading their facilities and merchandise, the services they offer, and their marketing techniques.[15]

Regional employment patterns will be altered significantly during the energy center construction period. Some highly-valued employees are likely to be lured away from low-paying jobs in nearby communities to work for the energy center developer. The wage rates of local employees will probably need to rise in order to attract workers.

Unemployment in the region surrounding the energy center site will decline, unless large numbers of unsuccessful job-hunters choose to remain in the area. Some local residents will be hired as laborers and to fill the

ten per cent of operating and maintenance jobs which are unskilled. Relatively few residents are likely to qualify for the skilled positions. However, more unskilled and semi-skilled jobs will become available in the local commercial enterprises which expand to serve the center workforce. New job-providing organizations may enter the area, often lured by the construction of transportation facilities (primarily railroad spurs and roads to service the NEC construction site.)

The expanded local economy will hold powerful attractions for local residents previously uninterested in joining the labor force. If the new entrant is a former housewife who opens a cafe and uses her profits to build a new home for her family this would probably be considered a positive effect. However there will also be cases which must be regarded less favorably - such as high school students leaving school to work for local businesses. Local unskilled and semi-skilled workers who receive on-the-job training as part of the energy facility construction program will become more mobile and tend not to remain in the area following completion of their jobs.[16] Another long-term problem will be that some residents may leave their jobs or businesses to work on short-term construction jobs, then find it impossible to return to their old positions.

The cost-of-living in communities adjacent to the NEC site will probably increase. Nuclear plant towns tend to be targeted by collective bargaining units for large salary increases.[17] Scarce goods and services (because of heavy demands) are likely to be subject to "price-rationing" resulting in high costs until adequate supplies can be provided.

A Battelle energy center study claims that the magnitude of cost of

living increases will vary according to:

1. the existing level of market development provided (in a very small area, marketing economies of scale may actually decrease the cost of providing basic goods)

2. the time frame analyzed (in the long run, equilibrium prices will be reached with other areas of similar size and income profiles in the region);

3. the existing regional cost of living index

4. the existing regional average income.[18]

Housing

The availability of adequate housing is often a major obstacle for communities attempting to accommodate the demands engendered by large-scale construction. As Gilmore and Duff state: "Until adequate new housing is produced, there tends to be a heavy exploitation of existing housing via increased rents, as well as rapid and shoddy construction at expensive rates."[19]

A twenty-unit NEC with fuel cycle facilities may spawn a total demand increase during peak periods, of up to six thousand housing units for single or unaccompanied married men and nearly 11,000 units to house families.[20] (These figures include the housing demands of non-energy center employees attracted to the area by the increase in employment opportunities.)

The Berkshire County Planning Commission study of energy facility siting describes a probable negative effect of the demand increase:

> Landlords may attempt to replace their previous tenants with construction workers and their families. There is a powerful incentive for owners to make this kind of switch. The total rent available from several workers, who are willing to pay substantial rents even for small and simple quarters, may exceed by a wide margin the rent which a permanent resident family can afford. Workers earn high wages and are willing to tolerate crowding and higher rents because they are in the locality only temporarily and their knowledge of the housing market is limited. The extra margin is likely to be more than sufficient to recover remodeling or conversion expenes even in only a few years.[21]

During the construction of the Calvert Cliffs nuclear plants in Maryland, some Calvert County public employees, most notably teachers, were displaced by construction workers and compelled to seek housing outside the county. Low income families were often forced to move in with relatives or leave the county as a result of rising housing costs.[22] Although this may represent an economically efficient solution to the problem, the equity aspects and socially disruptive implications of displacing people with community roots should be considered.

Some housing will be provided by renting out vacant rooms in motels, inns, and rooming houses. Owners of residences may rent out spare rooms or apartments to workers and their families. In many areas, this type of expansion is also feasible at a low cost to the owner, because middle-aged or older families often live in houses with more rooms than they need.[23]

Energy center developers may choose to purchase lots and import modular homes. A large segment of the housing demand can be met with permanent structures in areas which show promise of continued future demand. However if building codes are not strictly enforced, new housing of a shoddy nature may be erected, which could cause serious future problems for the community.

A major source of housing for construction workers has traditionally been mobile homes. Unless they are well-planned, concentrations of mobile home units can display extremely undesirable characteristics. Water and sewage supply problems are likely to occur. Drainage problems resulting from inadequate site preparation often transform mobile home parks into muddy swamps. In addition, recreation facilities for both children and adults are often lacking.

Mobile homes generally receive favorable tax treatment. So they add little to a community's tax base, yet their residents often require disproportional shares of physical and human services. For all of these reasons mobile homes should be tightly regulated. They are best utilized as a means to bridge short-term housing shortages with definite time limits on their use.[24]

The key to the housing problem is that permanent housing, if there is a market for it, is clearly preferable to more temporary solutions -- it adds to the community's tax base and therefore its capacity to produce needed capital expenditures and services.

Provision of Services

A regional population increase of approximately 45,000 will compel local governments to make substantial investments in the expansion of public services such as: education, recreation, waste disposal, sewage treatment, police and fire protection, transportation facilities, health care, administrative capacity, and social assistance of various types.

Decisions need to be made regarding the financing of these services and the degree to which they will be provided. Under existing systems, whereby taxes are imposed on the value of existing property and sales receipts, tax revenues from the incoming industries necessary to meet these needs are not likely to be realized until two to six years after the start of construction.[25]

If communities are unable (or unwilling) to furnish the services and facilities to accommodate the increased population; productivity declines, projects overrun time and cost schedules, and operating outputs lag[26].

Again, the concept of permanency plays a key role in the problem. Communities will not invest capital to expand their service infrastructure unless the changes are seen as long-term.

The single most expensive function of local government is education. The ability of each district to accommodate additional students for a temporary period of time is highly dependent upon the following factors:[27]

1. student enrollment anticipated in grades 1 through 12 and kindergarten throughout the school system.
2. the capacity of existing schools and planned facilities in the impact area
3. the availability of Public Law 81-815 and other federal funds to assist in needed capital and operating expenditures to offset local financial impact
4. the use of temporary classroom or modular units for quick availability of facilities
5. public acceptance of local board of education plans for impact relief.

Water and sewer connections generally need not be expanded proportionally to the population. However process sewage treatment and water supply capacity to handle 45,000 additional residents in a region is generally not available. Although with advance planning and financing the physical delivery systems can be built, in some areas of the country obtaining sufficient water supplies will be difficult.

Varying numbers of additional policemen and firemen may be required depending on local circumstances, such as housing densities and the extent of commercial and industrial development. There will also be a need for :

> special traffic policemen directing traffic where there is a substantial potential for congestion, increased patrolling of local highways to insure that the workers and trucks are adhering to the routes agreed upon, periodic inspection of the roads and highways for damage, and occasional special convoys for oversized loads.[28]

It will be difficult to recruit people for these public safety positions unless the community can project a sense of stability -- few fire or police personnel would be anxious to work in a boom town atmosphere, particularly considering the threat of "bust-time" layoffs.

Transportation and Congestion

Communities surrounding an energy center site must carefully coordinate their transportation facility expenditures with those of the NEC developer. Forceful county or state influence is also desirable because of the implications for future economic growth of transportation decisions.

Another major socioeconomic impact of NEC construction will be congestion caused by increased demand on ground transportation facilities in communities adjacent to the project. The movement of equipment, material, and the plant's labor force will place severe demands on the direct corridors to the facility and will probably require either new or improved transportation networks.[29]

Manpower, equipment, and supplies may be shipped to the construction site by truck, rail, or barge. In general, the heavier the reliance on motor vehicles, the heavier the impact on nearby communities. These impacts include increased risk of accidents, higher maintenance costs, increases in noise and dust levels, and congestion costs. In mountainous areas or rural country where narrow roads do not allow following cars to pass easily, trucks carrying large, heavy equipment can be particularly troublesome.

Economists and engineers have attempted to measure the costs to residents of these problems. The estimates are surprisingly high:

> For example, assume that the value of time spent doing things not in themselves desirable is as high as $2.00 per hour, and a family must spend one half hour more in driving each day due to congestion. Then an annual monetary value would be $2.00 per hour for 1/2 hour for each of 5 days for each of 50 working weeks which would be $250 per year, and it could go on for 3 years. This is a significant value. One-half hour is not an unrealistic figure for some of the families who are affected, considering all members of the family and the variety of trips there may be each day, and considering that cars are delayed by congestion and the need to use alternative roads which are not direct routes.
>
> Some monetary value of increased risk of accident and extra gasoline consumption would also be justified. The costs could be even more important, though more difficult to quantify if the congestion resulted in ambulances, fire trucks or other public service vehicles being delayed. Though these costs are quite unpredictable, they could be very large.[30]

The encouragement of energy center-related development in a single area of the surrounding region could enable the threshold demand level for an efficient mass transit system (for moving people and supplies) to be attained. Conversely, the construction of a mass transit system could be used to encourage workers to live in a single receiving area. If such a system can not be built and cars are the likely form of transportation, worker concentrations should be dispersed over a sufficiently wide area to avoid massive congestion around the site. A possible middle-ground if a few well-defined areas bear the brunt of construction personnel in-migration, would be to use buses and car-pools to transport employees to and from the work-site.

If the population increase is likely to be permanent, the erection of a full-service hospital within the region will probably be justified. This decision would be well-received in most rural communities where health care is a severe problem. However if the center's design calls for a relatively brief peak construction period and there are no plans to offset future declines, medical facilities should be constructed solely for out-

patient care.

Recreation facilities are an important social need which is often pared from hard-pressed local budgets. However the advent of newcomers with different recreational desires than those of existing residents will require significant additions to most communities' recreation systems.

The local institutional structure is also likely to be over-burdened. Banking facilities, professional services such as doctors, dentists and social workers, and the administrative capacity of local governments will all need to expand. Again, the prospect of a permanent increase in demand will probably be required to attract new professionals to the community.

Rapid growth often places severe strains on individuals' ability to adjust to changing surroundings. Services will need to be provided to deal with increases in divorce rates, emotional breakdowns, alcoholism, crime and emergency room admissions.[31]

The experience of Lincoln County, Montana during the construction of Libby Dam points to an additional burden energy center-impacted communities must shoulder -- a substantial increase in welfare assistance expenditures:

> As construction of the dam got underway, employment levels rose slowly, but the lure of high-paying jobs brought a surplus of workers to the county. Many of these early arrivals, already faced with financial problems, were unable to secure employment and consequently turned to the county for assistance. Arrivals throughout the entire period have sought the department's help in order to retrieve their children from foster homes and institutions located elsewhere. Finally, the influx of population brought additional people in need of advisory and case work . . . As project employment falls off rapidly, the demand for relief payments may be expected to rise. On the other hand, the concurrent movement of temporary population will reduce the overall work load in the department.[32]

Taxation

The problem of geographical and temporal mismatches between the need revenues and their realization is covered at length in the "fairness paper" being prepared in conjunction with this study. An assumption of this study is that some type of transfer system will be devised so that tax revenues from the energy center are distributed in such a manner that neighboring jurisdictions impacted by center construction and operations receive some tax benefits. The tax revenues eventually realized from an energy center are adequate to cover the costs of providing services for the increase in population.[33] However, it would be unrealistic to assume that communities will receive the tax monies until some time after the socioeconomic impacts of the center commence. Therefore a second assumption of this study is that communities will need to make arrangements to receive pre-payment of taxes from park developers, borrow on their own, or receive loan guarantees or grants from state or federal government.

Social Conflict

The social conflicts likely to be associated with energy center construction derive from the interaction between old and new residents and lifestyle:

> In general, people who live in rural counties and communities are long term residents who live there because they like it, not because they are forced to stay there for employment or other reasons. The factors entering into this preference include the residents' satisfaction with the rural, uncrowded atmosphere of their surroundings, the present condition of their homes and neighborhoods, the friendliness of the people, and community closeness. The people with such value judgments as these are the ones that will experience the greatest social impact from a large construction project in their area.[34]

It is probable that adjustments will need to be made between the needs of new

development and existing institutions -- especially in the political and legal framework. The resulting delay in the provision of facilities causes congestion of existing facilities, and other maladjustments, reducing the livability and productivity of the area.[35] Breese, et al. found in their study of large construction projects that "in virtually every case, the installation's effect on the host area involved a change from a predominantly rural or semi-urban type of living and development to an urban type of living and development."[36]

> The resident population will probably be suspicious and afraid of the outside construction workers, partly due to the workers being strangers, partly to their large numbers, and partly of oft-publicized past history of "trouble" in areas around construction sites.
>
> There will also be problems arising from the work place: local dissatisfaction at hiring practices of contractors at the site, or union regulations on hiring; and the normal mixing of some outside labor with local labor may cause tension. Construction workers have special needs of their own, atypical of the permanent population. Their interests may be different because they come from other regions or different ethnic backgrounds, or different socioeconomic strata than most of the host population. Skilled construction workers usually earn relatively high wages, but have less formal education as distinct from on-the-job training than other persons at the same income level; this may make their interests quite different. Finally, the very fact that they are away from their permanent homes, often without their families, makes recreation interests different, and also makes their plight in circumstances such as illness or legal difficulty more serious.[37]
>
> Residents may hope to exploit the workers by charging them high prices for goods and services, counting on the high incomes the workers earn to make them less cost-conscious in buying. Beyond that, the residents may hope to have nothing to do with the workers. Local community leaders, with the assistance of regional planners, can do a great service if they lead residents in some advance discussion of possible problems. The assistance of representatives of construction contractors and of local unions, residents who are themselves construction workers, and persons with experience in other areas where such problems existed should be enlisted. The local discussion should include local police, merchants, and church and social organizations, as well as local planners and other officials.[38]

Once operating personnel enter the area a new type of "old vs new" problem will appear -- resentment of newcomers' above-average education and income levels. In a sparsely populated region, the addition of even one-hundred such families who actively participate in the community (a common characteristic of highly educated, well-paid personnel) may make an important difference in the social and cultural life, and the work of civic, charitable, and fraternal organizations.[39] Social scientists analyzing Brevard County, Florida detected a reluctance of voluntary institutions to integrate Cape Kennedy employees into their membership ranks -- indicating the very real possibility for conflict which will exist.[40]

A further source of conflict will be water rights disputes. Energy center developers will, in many cases, be competing with the agricultural community for water which is also required for food production.

Finally, the security requirements of a nuclear energy center could prove to be distasteful to nearby citizens. If residents develop a feeling that they are "being watched" by plant personnel hard feelings will inevitably develop.

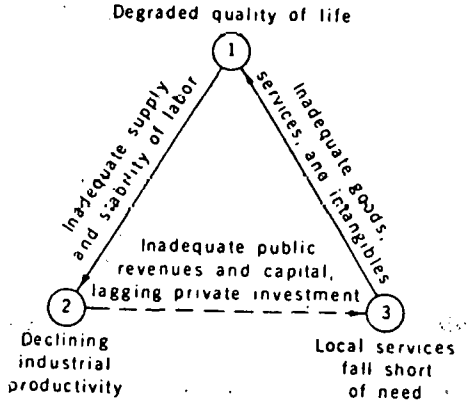
The boom town concept highlights the dangers posed by the socioeconomic impacts of large-scale construction. The boom-bust cycle represents the polar case where construction is rapid, pre-planning is negligible, and the prospects for continued development are uncertain.

UNCONTROLLED RAPID GROWTH -- THE BOOM-BUST CYCLE

The Boom Town

If the temporary nature of a construction project and the magnitude of its socioeconomic impacts on a single community are extreme, a boom town situation is likely to develop. The following overview of boom-town problems, is primarily derived from studies of Rocky Mountain coal mine areas. It indicates the danger of rapid urbanization through massive infusions of people for rural communities ill-prepared to manage the transition. The findings dramatize the need not only for financial assistance, but assisting unexperienced host areas to comprehend the nature and rapidity of impending impacts.[41]

Gilmore's stylized version of the "problem triangle" constitutes the most advanced effort-to-date to analyze the boom-town problem:[42]



The quality of life in very rapidly growing communities is frequently so undesirable that, despite the availability of jobs, it becomes difficult to attract workers to the area. Productivity declines as employees are pirated between industries and lower-quality workers are hired. The result is a lag in private investment as the community becomes less attractive to investors. Insurance companies even stop writing casualty

coverage.

The decline in investment makes it even more difficult to achieve the timely provision of needed services. As services fall further behind needs, the quality of life deteriorates still further.

Industrial developers frequently respond to these negative effects by compounding the problem -- they build "company towns" with convertible mobile homes sites and prefabricated temporary schools. However, such living circumstances often result in troublesome social problems: a lack of institutional structures, a feeling of malaise on the part of wives cooped-up in trailers, and increases in alcoholism and divorce rates. Other mobile home "subdivisions" spread through unincorporated areas and become not only blights upon the land -- they have no grass, trees, or sidewalks -- but also serious fire hazards.[43]

The dilemma created for local communities by short-term construction are indicated by the common characteristics of laborers' lifestyles: they may live in a large house recently converted to boarding houses by the owner. Most of their earnings are sent to relatives outside the community. They find the town's social and recreational outlets unsatisfactory and spend their time watching television or frequenting local taverns. The workers' economic and social segregation from the community results in their presence imposing more costs than benefits on the locality.

> Members of the indigenous labor force are often lacking in the training which would fit them for the types of jobs which become available. Therefore, they either do not participate in any benefits which the economic development would otherwise offer or are consigned to the most menial types of work.[44]

The planning staff of boom town areas tend to be woefully small -- or non-existent -- yet new and expanded public services must be designed, financed, and erected. Recreational, cultural, and adult education facilities must be developed. Landscaping and parks are necessary to prevent the community from taking on an overbuilt appearance. The school system's capacity will need to be expanded. However, state legal limits on bonding (e.g., ten percent of assessed valuation) often intensify the problems of financing the new construction. This problem, coupled with the difficulty of recruiting new teachers for rural boom towns may compel the initiation of double shifts.

Health care is a major problem for Sweetwater County residents. There is one doctor for every 3700 residents. It has been estimated that 40 percent of the county's residents obtain medical care elsewhere. Because of the crowding of the physicians' offices and delays in service, the Rock Springs Hospital emergency room is overburdened with patients, many of them non-emergency cases. It handled an average of 1,300 cases a month during the first quarter of 1974, in spite of the basic charge of $26 for an "office call" at the emergency room.[45]

Instances of social dysfunction will spiral:

> The mental health clinic caseload at the Southwest Counseling service in Rock Springs has expanded ninefold in the last five years (while population was not quite doubling). Much of the increase is from long-time residents of the area. Much also is from newcomers; many of these cases are indigent, attracted by the boom but unable to participate in it. As a result, rates of alcoholism, broken homes, suicide and suicide attempts, and down-and-outs have increased.[46]

Air pollution caused by increases in airborne dirt and vehicle traffic may require the initiation of expensive abatement programs.

The acute shortages of land, housing, and services in boom-towns

cause housing prices to rise even faster than in less-heavily impacted areas, often surpassing the purchasing power of all but skilled construction workers and operators. Older residents are pressured to leave their rented housing and the community to make way for newcomers with greater financial resources. In Sweetwater, Wyoming in 1974, the lowest price for which the Total Development Concept Corporation could offer single family, detached units of 808 square feet to 1206 sqare feet was approximately $33,900 to $43,200.[47]

This housing problem has arisen because:

1. Labor costs are extremely high and labor availability is uncertain. Construction labor for housing must be imported from other labor markets, housed, and guarded against pirating by other employers.

2. Developers must often build their own sewage treatment facilities at added cost to the buyer.

The newcomer-older resident hostility discussed previously will again be evident. The deterioration of community lifestyles will heighten the tension as construction workers become the scapegoats for disgruntled citizens.

The severity of these problems and the importance to residents of adequate public services is indicated by the following September, 1974 survey of the Rock Springs-Green River boom community:

> Local wages, job satisfaction, and career opportunities were found to rate very high among newcomers. Nonetheless, 60 percent of the newcomer households said they planned to leave the community within one year unless health services were improved, despite the fact that September 1974 was a recession period and a comparable job might be hard to find. Housing problems were a similar source of dissatisfaction likely to cause departure from job situations perceived as good. The quality of santitation services, road and street maintenance, schools, and shopping facilities also were deemed low enough that each justified leaving the community in the opinion of a third of the new-comer households queried.[48]

Bust Problems

The major readjustment problems following the boom occur in the commercial sector. Businessmen may become accustomed to "easy sales" to construction workers, who earn high wages and do not know the region well and so may be inclined to buy without much "shopping around." Businesses may fall into bad habits and lose their competitive vigor during the construction boom, which hurts them badly after the boom ends.[49]

Workers who have been trained to fulfill energy center construction needs may not be able to find jobs fitting their training after the project is finished. They may then be forced to return to their previous jobs, if they are available, or to move elsewhere. Their old employers may have gone out of business due to the lack of labor during the construction period; their farms may have deteriorated beyond repair. The people then have the choice of remaining unemployed or moving out of the region, perhaps forced to continue as migratory construction workers. In this case it would not be clear whether or not these residents of the region benefitted from the project.[50]

One factor offsetting the loss in retail sales would be the improved financial status of the community. As power generating units come on line tax receipts should be sufficient to support the provision of high-quality services for remaining residents. Residential taxes can be lowered while improved facilities, particularly schools, provide attractions to new residents. It may well become possible to attract new industry to the area which would help to sustain the community's economic activity.[51]

The events which precipitate a boom-bust cycle are large <u>temporary</u> impacts where the incentive to invest in new facilities does not exist,

and the resultant lag in services during the "catch-up" period. This observation points to the importance of ascribing as great a degree of permanency to the energy center work force as possible. The crucial importance of planning will be elaborated upon in a later section of this paper.

COMMUNITY AND REGIONAL DEVELOPMENT ISSUES

Origin of Workers and Commuting Patterns

A nuclear energy center construction project, employing approximately 10,000 workers would exert a tremendous influence over a region's economic development. It is therefore important to know what factors determine: (i) how many of these workers are likely to come from outside the region and (ii) where newcomers to the region are likely to reside.

A typical construction work force for a nuclear plant consists of various craftsmen, including pipefitters, laborers, electricians, iron workers, carpenters, operating engineers, boiler-makers, millwrights, painters, teamsters, and others. A utility usually lets contracts for its construction projects and the contractor (or contractors) negotiates with the unions. Generally, each of the various crafts is represented by its own union and has its own individual labor agreements.[52]

The following excerpts from the Berkshire, Massachusetts Regional Planning Commission study of energy facility siting indicate the crucial influence of union agreements on energy project regional impacts:

> Labor union practices are extremely important in determining the geographic origin of labor on a project. This is a subject seldom discussed in the regional planning literature, or in public relations material of electric utilities, but it is freely talked about by persons knowledgeable on construction.
>
> Construction labor is highly unionized, with workers organized into individual craft unions. Each craft union is divided into geographical districts called "locals." Boundaries of union locals are as real and important to unions as municipal boundaries are to governments.
>
> The locals have considerable influence, on some jobs almost sole power, in the hiring of workers to do particular jobs, or the transfer of workers from one job to another. The contractor may have almost no power to specify which applicant for a job gets the job, except for important supervisory jobs. He may routinely call the union "hall" which may be no more than the

union business agent's office with his labor needs and ask that they be filled. The local will then determine who get the jobs which are open.

A local may have established members who have experience in construction but who are currently unemployed, or who wish to change jobs, and they will be given preference over new persons seeking employment in the locals' jurisdiction; either experienced workers coming from other locals' jurisdictions or local residents who are not members of the local.

A local may have very wide geographical jurisdiction and must be concerned with finding jobs for all members living in that area, including those who live far from the construction site. Unemployed members from some distance away may be "next in line", and be given work over a person who lives very near the site, but who has less experience and union standing. The union hiring hall, where screening and union membership are arranged, is conveniently located for the local's whole jurisdiction, but may be far from the site and inconvenient to persons living near the site. As a result, the economic impact of the construction will be spread over a wide area, but not uniformly; it may actually skip over, as it were, some localities very near the site. Residents of communities near the construction site may naturally expect to find jobs easily, not understanding the various requirements of skill and union membership. They may be disappointed when they are turned away. The problem will be compounded if there are several different craft unions, which follow different rules and face different supply and demand conditions for their members.[53]

A high priority of regional policymakers should therefore be the negotiation of union contracts which preserve opportunities to obtain employment for nearby residents at the NEC site. Unions may be willing to exchange their approval of well-developed training and apprenticeship programs to benefit local residents for the promise of stable long-term employment.

Regional economists frequently use "gravity flow" models to estimate the residences likely to be selected by project employees.[54] This method weights the attractions for incoming workers of potential residential locations. For the purposes of this paper it is sufficient to indicate the attractions which prove to be significant.

If the NEC is located in a rural area that is within reasonable commuting distance (one hour's drive) of a major urban center, from 40 to 75% of the work force required for construction of the NEC is expected to be drawn from the local labor market. The remaining 25 to 60% of the work force is expected to move into the urban region, probably around the fringes of the urban area closest to the NEC. At least 70% of the 975 to 4800 workers moving into the area are expected to be married and to bring their families with them.[55]

Most impact assessments use 50 miles (assuming the existence of good roads) as the maximum generally acceptable commuting distance for construction workers. The strength of this urban attraction is further indicated by the following observation:

> During construction projects at the nuclear test site near Mercury, Nevada, in the 1960s the peak work force was 10,000 (operating and construction workers). A relatively high percentage of workers commuted approximately 70 miles from the Las Vegas area to the site. The highway system leading to the site was in good condition and bus service was subsidized for the permanent employees. The temporary construction workers received a travel allowance.[56]

Battelle researchers found in their analysis of the socioeconomic impacts of a dry-cooled NEC that:

> The availability of housing, public and private service facilities, and transportation makes a dramatic difference in the living locations of construction and operating workers.[57]

Therefore, the eventual settlement pattern of newcomers can be influenced if mechanisms exist to selectivly upgrade the public infrastructure of communities within the region.

The general state of the labor market is another determinant of the origin of NEC construction workers. Wages in construction are quite high and will tend to attract workers from other industries. If the region

has many low-wage industries (agriculture or services, including tourism and some types of manufacturing), the drawing power will be greater, and the proportion of local residents employed at the construction project greater. Finally, the local unemployment situation is an important factor. The more unemployment in the region, all other things equal, the more local residents are likely to work on the project.[58]

New Communities Versus Expanding Existing Population Centers

One strategy for minimizing the effects of energy center construction on communities near to the site would be to focus the impacts of construction on a "new town". However, many regional scientists argue that the financial and political problems encompassed by such a scheme are insurmountable -- neither government nor industry has shown an inclination to become involved in operating such a venture. Although this paper focuses on the social and economic effects of NEC construction on existing communities, it should be remembered that new towns are a conceivable alternative.

Balance Between Regions and Communities Within Regions

It can also be argued that nuclear reactor siting policies should be explicitly coordinated with regional development programs. The rationale behind such a proposal is that a complimentary relationship exists between energy centers and United States regional development concerns: the establishment of centers is dependent upon acceptance by a region of tremendous development, while distressed regions are in need of (among other things) massive infusions of capital.

An implication of a regional development strategy is that the energy center-induced economic inputs would be directed into a limited number of locales within the region. This channeling procedure would prevent the economic benefits from becoming so widely diffused that the threshold development levels required to form a foundation for continued growth could not be attained. The techniques to promote specific areas within an impacted region include incentives such as park and ride facilities, mortgage insurance, subsidized mortgage interest rates, tax incentives, and provision of public services, particularly sewer collection capacity.[59]

According to this proposal, nuclear energy center associated development would not only be an instrument of social policy, but also a means for promoting regional equity. That is, areas such as Hanford, Washington (where planning for an NEC is at an advanced stage) seem to be willing to accept an energy center even though much of its output will be exported to areas such as California, which are generally hostile to new energy projects. Therefore, if Hanford so desires it should have every opportunity to reap significant economic development benefits from its decision.

The effective coupling of regional development and energy center siting concerns would require vigorous state or federal intervention in the energy center planning process to be sure that local residents and needy citizens from outside the area would actually benefit. Timely manpower training and infrastructure development assistance would also be essential to implement such a strategy.

NEC Development Decisions Which Influence the Extent of Further Economic Development

It is valuable to note the conditions likely to engender a "take-off" in a community's economy following the stimulus of energy center construc-

tion. With this knowledge it is possible: (i) to predict the consequences for future developments of the NEC's economic impacts and (ii) for communities to develop policies which will enhance or restrict (according to the goals) the economic development stimuli of a nearby nuclear energy center.

The primary requirement for growth is the availability of "community infrastructure" -- such as transportation facilities, schools, and housing. The infrastructure investments by energy center developers and local communities could prove to be a powerful incentive to new industries. For example, the new transportation facilities, such as access roads and rail lines, by the plant could become a significant attraction.

If energy center promoters create regional demands, local economies will be stimulated -- with a multiplier effect as noted earlier. Therefore, decisions regarding the extent to which goods and services (e.g., labor, housing, gravel, etc.) are purchased from within the area will be a major determinant of the energy center's economic impact on the region. An energy center commitment to purchase large quantities of piping, sand, gravel, hand tools, etc. from within the region would provide a long term incentive for new firms to enter the area.

If the commercial establishments in a community are to take advantage of the retail opportunities which accompany energy centers they cannot remain complacent. A danger is that they will experience a rapid decline following the initial upturn in sales. Large shopping centers will be built and in town merchants will only be able to compete if they modernize their facilities and provide adequate parking.[60]

The prospective decline in tax rates are also a potential attraction for new enterprises. The increase in the tax base could be used to lower

industrial rates to encourage growth.

Alternatively, communities or regions may choose to limit the amount of growth resulting from an energy center. The key components of such a strategy are:

1. minimizing the number of workers entering the region
2. limiting the amount of permanent infrastructure provided.

The number of workers required for construction of the center can be reduced by expanding the use of overtime, thereby limiting the number of employees required and the need for residential infrastructure. Concerted efforts to train local residents for energy center jobs will also reduce the importation of workers -- if accommodations with unions can be negotiated. The number of secondary construction workers entering the region can be cut by maximizing the use of prefabricated facilities.

Infrastructure decisions for communities which desire to restrict long-term growth are very tricky. They must avoid the disamenities associated with temporary facilities, yet not provide future excess infrastructure capacity. The types of policies which fulfill these goals include:

1. limiting most residential capacity to well-planned mobile home parks which are licensed to operate only during the NEC construction period
2. pressuring the energy center to limit its purchases from suppliers within the region (so that new firms are not attracted to the area and existing firms are not induced to expand)
3. building water supply and sewage lines in stages to prevent "sprawl" development.

Control over the development impacts of an NEC requires a heretofore unmet degree of cooperation between energy facility planners and nearby communities. Highways, educational facilities, waste disposal and other

complementary local development programs must all be carefully planned. The incentives for such an extraordinary degree of cooperation do exist. Effective planning can reduce the costs of construction for both energy center builders and nearby communities. Growth management is becoming increasingly accepted as falling within government's responsibility.

The generally unfavorable responses to energy center site proposals by nearby communities provide ample warning that energy center promoters must be sensitive to community desires. Whether a community desires new development or restricted growth, energy center developers will be constrained to cooperate if they expect to receive the political support they clearly need.

Communities subject to NEC construction impacts may also attempt, for the following reasons, to attract additional industry to the area using non-energy-center-related incentives such as tax breaks, training programs and zoning variances:

1. To dampen troughs in economic activity

   At Calvert Cliffs construction workers frequently found jobs at the nearby Columbia gas plant which was also being erected.[61] If an energy center should experience lengthy construction delays (e.g. because of concern over some aspect of its design at a projected reduction in electricity demand) the regional economic impact of the interruptions would be somewhat blunted if other building activity continued.

2. To promote diversity in the background of newcomers to the region

   Since nuclear energy center operating and maintenance personnel tend to be white-collar workers a community may attempt to "balance" the influx (following the completion of energy center construction) with a steel plant which predominantly employs blue-collar workers.

3. To create expectations of future economic stability

   The creation of permanent, high quality facilities to meet the service demands imposed by NEC construction can only be

justified if the increased levels of regional population and income are expected to continue in the future.

4. To improve local employment prospects for local residents

Non-union industries such as apparel firms would be induced to enter the area to provide additional unskilled jobs which local residents could obtain. (These industries would probably require significant financial enticements to enter the area since the wage scale will probably have been bid up by energy center construction to higher levels than they are normally willing to pay.)

IMPLICATIONS OF NEC TECHNICAL CHOICES

Buffer and Low Population Zones

No decision has been made as of yet regarding the size of the exclusion area and low population zone which would surround an energy center. The rationale for population and development restrictions is to insure that the population number and distribution be such that "there is a reasonable probability that appropriate measures could be taken in their behalf in the event of serious accident".

The NRC has not attempted to limit development in the area surrounding nuclear facility exclusion zones. However, a NECSS-75 contractor study has suggested that, in the case of energy centers, it may be advisable to create permanent "buffer zones" around the exclusion area. Government would buy up development rights in these regions and make it a policy to prevent any new economic activity in the area.[62]

It is beyond the scope of this study to examine the reactor safety arguments which lie at the heart of this issue. Nevertheless, a few observations regarding the implication of large buffer and exclusion areas for the magnitude of the regional social and economic effects of an NEC are in order. The reduced quantity of land readily accessible to the site would result in intensive impacts for those areas surrounding the

buffer zones. These communities would need to accommodate both the workers who are willing to commute long distances and those who would have settled closer to the site.

A possible alternative would be to simply offer relocation assistance to those who wish to leave the area and then assume that those who enter understand and accept the risk. The concept of permitting newcomers to join older residents who wish to remain in the area closest to the center boundaries should be considered. The additional development fills an area which would otherwise be used less efficiently. Not only is land utilized for socially valuable purposes, but the occupants of the land are voluntarily located there. Therefore, by permitting voluntary migration into the area regulatory authorities increase the value of the surrounding land, enabling higher compensation payments to be offered those citizens desiring to leave. Land that is usable, but at some risk, is allowed to provide significant social benefits, primarily for those people willing to assume that risk.

Construction Rates

The work force peak is significantly affected by the reactor completion intervals. If the reactors are completed every six months, the 20,000 work force peak for a twenty-unit NEC with colocated fuel cycle facilities would be reached during the seventh year of a twenty-five year construction period. In contrast, if the reactor completion interval is every year, the peak work force would be 10,000 in the thirteenth year of a twenty-five year construction period.[63]

This dramatic difference in the magnitude and timing of the installation's peak manpower requirements clearly indicates that in terms of

managing socioeconomic impacts, the development rate decision is crucial. The final determination must include many more factors (such as costs to the park developers) than regional impact, but it is important that policy-makers create incentives for the costs and benefits of rapid development to the region -- not just to the NEC developer -- to be factored into the decision.

Colocation of Fuel Facilities

The colocation of fuel cycle facilities in an energy center tends to level the workforce requirements over the construction period -- an efficient use of manpower is to concentrate on fuel facility construction following the completion of much of the reactor work. Fuel operations can then be phased in as reactor capacity builds to a level sufficient to effectively utilize the fuel fabrication and recycling facilities.

Besides levelling the construction workforce requirements, the colocation of fuel facilities at the center would improve the likelihood of the region avoiding a "bust" following the construction peak. The highly-educated nuclear fuel cycle facility operating and maintenance force represents the nucleus of what could easily become a powerful center for technological innovation -- a factor which has proved attractive to entrepreneurs in the past, as evidenced by the mushrooming of technical firms along Boston's Route 128 and suburban Maryland's Route 270. Morris, Illinois where seven nuclear reactors and a fuel recycling facility are being built within 35 miles of one another, has experienced a rapid increase in firms specializing in research and development.[64]

THE ROLE OF PLANNING

The major lesson of this study is that planning for the accommodation of NEC-related social and economic impacts, since they comprise a major segment of the environmental impact of each NEC, should be integrated with the initial design phases of the center itself. The primary objective of such a policy is to insure that the socioeconomic impacts of technical design decisions are taken into account.

Planning must also begin early to adapt to the long lead times required for effective socioeconomic impact management--it takes months simply to determine the prospective needs and desires of a region's residents. And it requires years to implement the findings of those needs assessments. The upgrading of political and social institutions and the building of schools, housing, roads, churches, etc. must commence as swiftly as possible following NEC site selection if they are to be in place for the expected onslaught of newcomers.

Growth Management

The planning required to accommodate a nuclear energy center's socioeconomic impacts is essentially a form of "growth management." The National Environmental Protection Act's definition of the concept is:

> (to) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities.[65]

Gilmore has attempted to identify the components of an effective growth management policy. The following four essential functions of growth management summarize his findings regarding public responsibilities if "balanced growth" is to be attained:

1. balancing basic and induced capital investment- insuring that capital investments in public infrastructure are "adequate both in dollar amount and timing to accommodate increased population resulting from the incremental investment in basic plant."

2. affecting resource use and conservation- regulating the use of national resources such as land, air, water, and minerals.

3. developing the labor force- balancing the supply and demand for labor

4. accommodating and retaining population- encouraging both newcomers and older residents to remain in the community so that growth can be lasting and profitable.

The legislative and administrative tools required to implement these functions are listed in Appendix A to this study.

Growth management programs are dependent on the establishment of institutional mechanisms whereby the parties affected by imminent growth can be brought together to state their positions and to negotiate the necessary trade-offs. For example, the Sweetwater County Priorities Board has provided a means for county and local officials, industry representatives and citizens-at-large to exchange views on issues arising from the rapid natural resource development in Rock Springs and Green River, Wyoming.

The board stays in contact with state and federal regional council officicals and relies on citizens and techinical committees for their advice. Its purposes are:

1. To provide regular communication between local government and industry on information and plans of mutual interest.

2. To analyze current and future local problems and recommend priorities for their solution.

3. Short-range--to work out coordinated proposals for industry help in solving boom problems, the help to be furnished in lobbying support, manpower, or money (or equipment) as appropriate; and to coordinate approaches to Wyoming State government for related assistance.

4. Long-range--to move toward economic self-sufficiency for local government and an adequate capability for managing the growth of Sweetwater County.[67]

Public development corporations are another example of institutions which integrate various groups involved in the growth management process into a policy making body. In this case local and state government goals and resources can be coordinated. This financing mechanism would take the form of a public or state corporation with the authority to issue revenue bonds for public purposes. An arena for local-state policy coordination is created with the tax advantages of state financing.

Experts native to the region involved should be recruited to assist in the planning process--they will tend to be more sensitive to regional culture and needs than outside consultants.[68] A "social impact assessment" (discussed in the next section) should be employed to sensitize and inform policymakers, many of whom will be from ouside the area, to local needs, concerns, and attitudes.

A National Association of Counties Report states that "opposition to planning is nationwide. Historically, Americans have treasured the right to do as they wish with their property and they often see planning as an infringement of this right."[69] Nevertheless, the establishment of priorities, coordination and cooperation between industry, citizens, and all levels of government encompassed by growth management yields benefits which may well be sufficient to overcome this barrier.

1. the existence of regional or at minimum, local land use plans can help prevent the environmentally and fiscally costly sprawl-type development which is otherwise likely to occur.

2. permanent employees can be encouraged to settle in the same town as the construction workers who preceeded them, enabling some construction workers to live in permanent housing (which would contribute to the tax base)

3. the construction of service and complementary industries in the area can be coordinated with that of the NEC so that fluctuations in the construction force can be minimized.

4. multiple uses can be planned for transmission line routes.

5. Timely assistance can prevent inexperienced local communities from making costly mistakes. For example, Pennsylvania State Highway Department consultants working through Lower Bucks County officials spurred local communities to adopt adequate "set back" requirements for the new construction stimulated by the Fairless Works steel plant. Otherwise the county might have, in the near future, had to spend millions to reacquire rights of way for needed highways.[70]

6. Communities with planning and growth management institutions can take advantage of state and federal grants and planning assistance. If federal and state officials perceive that no planning capacity exists, the community's interests are likely to be ignored for lack of a competent representative with which to deal.

7. Early planning will enable communities to deal cooperatively with the energy center developer. Again, without some evidence (such as a competent planning body) that the community is attempting to develop goals for its future, developers will be inclined to circumvent the local political arena.

Social Impact Assessment

There have been anguished outcries from Ocean County, New Jersey and other areas in response to the faint possibility of siting an energy center in their region. These reactions indicate that socioeconomic impacts (or public perceptions of them) may well be the decisive factor determining whether NEC's are built. Therefore they deserve close scrutiny. In general, the socioeconomic impacts of an energy center result from the effects of rapid economic growth. Growth is as much a social as an economic process. That is, as most economists agree, to predict and manage growth and development, it is imperative not only to analyze market forces, but cultural attitudes, perceptions, and institutions.

Social impact assessment methodologies are being developed, in part, as a response to certain shortcomings of cost-benefit analysis. Cost-benefit analysts are hard-pressed to assign values to the social consequences of a

project.[71] Social impact assessments are attempts to determine, categorize and analyze the "changes in individuals actions and orientations or in the structure and functioning of patterned social orderings that occur in conjunction with an intentional technological innovation."[72]

The Hartsville nuclear station environmental impact statement[73] represents a major mile-stone in the drive to promote greater attention to energy projects' social effects. The Nuclear Regulatory Commission compelled the Tennessee Valley Authority to form a detailed mitigation strategy to deal with the plant's socioeconomic impacts (defined as population growth, development coordination, housing, education, utilities, local governments, medical services, and traffic). This requirement compelled the T.V.A. to become far more cognizant of nearby communities' socioeconomic make-up than would have been the case with the sketchy impact assessments required thus far.

In order to attain such a thorough understanding of a community's structure it is necessary to be aware of public attitudes. A major goal of social impact assessment is to determine through surveys;

1. orientation of present residents to their community
2. changes they anticipate accompanying construction and operation of the plant
3. how the residents evaluate the changes which may be brought about.[74]

In addition, indicators are developed to determine the social changes that take place. Changes in statistics such as divorce rates, unemployment, alcoholism, and average incomes are monitored. The eight sets of indicators proposed in a Battelle Human Affairs Research Center report[75] are listed in Appendix B. The indicator categories are: demographic, economic, habitat, services, social organizations, cultural/recreational, personal (illnesses and satisfaction) and political.

Impact forecasts and program evaluations are then re-evaluated in the light of the knowledge gleaned regarding attitudes and social indicators. The goals of social impact assessment promoters are to enable local review boards to work closely with developers and:

1. encourage design changes to minimize negative impacts.[76]

2. determine the probable effectiveness of proposed growth management and socioeconomic impact mitigation programs. For example, they would point out the futility of relying on zoning to control growth in most rural western communities--it is impossible to obtain political support for zoning ordinances in these areas.

Subsequent monitoring of changes in indicators over time permits evaluation by policymakers of:

1. new policies and institutions (e.g., health-care facilities) introduced into the area, and

2. social trends (such as increases in the rate of psychological afflictions) which may develop.

Universities can assist localities to develop the data-gathering and tabulating capacity required to keep indicators current. High school and community college students could carry out the actual data-gathering as part of social studies curricula.[77]

Indicators can be explained with little difficulty to local citizens. This advantage could be of crucial importance--"organized and informed citizen participation can provide a constructive alternative to the recurring phenomena of social disorganization attendant to the boom-bust phenomenon."[78]

Structural Differentiation

Social impact assessments provide insight into a determinant of probable community responses to change that economic base and cost-benefit studies neglect--the concept of structural differentiation or institutional complexity.

The following excerpts from a University of Colorado study graphically portray the potential value to energy center planners of this concept.[79]

The structural differentiation or institutional complexity of a community, measured by the number and kinds of institutions (e.g., number and kinds of schools, retail and wholesale establishments, health and welfare services, recreational establishments, churches, associations, government offices and planning services) is one dimension that can be constructed from readily available data. Another strucural dimension of any community is its linkages which may be thought of as those organized activities which connect one community with another.

"Active linkages" are economic firms buying or selling beyond community boundaries or the relationships to state and federal offices and agencies located in the community. "Informational linkages" are those that transmit information between communities such as educational institutions, churches, mass media, professional associations and labor unions. "Passive linkages" would include the use people make of highways, telephones, libraries, airports, railroads, and bus lines. Finally there are non-institutional linkages such as commuters, informal visiting patterns and return migrants.

1. If a community shows a high degree of structural differentiation and also has many linkages, the probability for such communities to adapt to the impacts from rapid growth are good.

2. A community with a low level of structural differentiation (not many job specialties or institutions) and few structural linkages is in a poor position to deal with complexities attendant to rapid development. Low differentiation implies that it does not have at its command the necessary skills for planning. The limited or weak communication linkages imply that it has an insufficient flow of information for planning and rational decision making. Much that is decided upon has to be based on hunches, hearsay, rumors. Such a community requires ouside help from public institutions to maintain its identity as a community and self-respect for its citizens.

3. There will be communities (especially new communities, or new sections of older communities) which may be characterized by low levels of structural differentiation, but by virtue of their importance to the energy-exploiting industries, state and federal governments, they will have many structural linkages. Impact on such communities will mean that a relatively undifferentiated labor force will produce population growth (i.e. mostly blue collar workers) but if the industry is part of a larger industrial network and laborers are unionized, the community's linkages are many. Studies have shown that newcomers have higher salaries and are younger than the indigenous population. This contributes to increasing social class distinctions and potential local conflict. It is entirely possible that the "new" population will take over the affairs of community life, (leaving the "old"

population out of social as well as economic amenities) or the company will manage local affairs (the "company town"). It is possible to maintain some semblance of "order" for a while, but eventually special interest groups will organize in reaction to perceived inequalities in income, prestige, or social decision making and react violently. The results are strikes, social disruption, or excessive litigation.

4. There is a fourth type of community social structure. These are the larger communities (urban, but not metropolititan in character) which will be more indirectly influenced by rapid growth. These communities are characterized by a relatively high structural differentiation, but linkages are relatively weak (information-flow to and from large centers i. inadequate). Communities of this kind feel isolated from state and other commercial centers and not infrequently its citizens complain about "being left out". They feel helpless in promoting and developing a plan in an attempt to obtain a hearing; or in sharing in the larger decision-making process at the state capitol. The consequences of such structural imbalance, may have repercussions for the stability of local governments. Interest groups form and tend to turn inward; people who met and communicated rarely now begin to ask one another "what can be done about the situation?" If this process of defensive deliberations continues, coalitions of irate citizens groups are formed against the "enemy" (i.e., the government, an industry, an enforcement agency). Solidarity movements form which can only be directed into community productive channels if linkages are created with larger centers.

The existence of growth, differentiation, and structural linkages indices could be invaluable to local policymakers, if they are provided training in their utilization. For example, the knowledge can be used to prepare local leadership for their new roles as growth managers. The information provided by social indicators highlights the wide-ranging intangible aspects of quality of life which must change to accommodate growth. Both energy developers and governmental officials will be better apprised of the myriad problems of integrating newcomers into a community.

Services which are relatively inexpensive to provide, yet surprisingly responsive to social needs may become apparent. Three possibilities for combatting the problem of mobile home-bound spouses are:

1. A systematic effort could be mounted to identify employment opportunities in work activities that could be conducted at home.

2. Use could be made of extension-type activities by universities to provide continuing education opportunities.

3. Even something as prosaic as the mandatory provision of cable television could be very useful.

Governmental Responsibilities

Local

Depending on the constitutional provisions of the state involved, county or local governments (or both) will be responsible for the bulk of the growth management decisions occasioned by nuclear energy center construction. Archer Church, following his study of Seneca, New York's response to the construction of a large military base, constructed four determinants of the quality of a locality's response to rapid change.[81] The findings of this study confirm the applicability of these traits to determining the likelihood of a community responding positively to the social and economic impacts of an energy center. They are:

1. the quality of leadership in the community

   Bressler has found that leaders in communities experiencing rapid change often delay in providing neededne w services because of reluctance to precipitate undesirable changes in social structure.[82] This frailty of leadership would doom a community to the vicious circle inscribed by Gilmore's "problem triangle". Local officials must respond to the imminent changes early and forcefully. They should structure and lead the discussions of whether the community wants to expand or diversify or retain as much of its existing character as possible. These decisions then need to be effec-

tively communicated to other levels of governments and energy center planners. They need to tackle the unpopular issues--particularly building awareness of the need for social services.

2. the availability of physical and economic facilities to provide services for the new population.

   If spare capacity does not exist for providing public services for new residents the community must arrange for its erection in a timely manner. Capital expenditures require a particularly early start. This will generally require negotiations with other levels of government and energy center developers for assistance in funding these services. The construction of these facilities must be carefully managed so that they "come on-line" so as to accommodate growth at the rate decided upon by the community.

3. the community's "institutional experience"

   "Institutional experience" refers to the community's accumulated experience with managing the problems of growth. If a community has not previously provided the services which will be required it should hire planners and consultants (from private or public sources) to provide technical assistance.

4. the community's attitudes towards newcomers and change

   Finally, the community's attitude towards newcomers and change will significantly effect its ability to respond to energy center construction. These attitudes can be modified to some extent by educational campaigns under local and outside sponsorship to "clarify the unknown". But in the final analysis, some community cultures are simply more adaptable than others--park planners

would be well-advised to recognize this vital sociological aspect of siting.

State

Important regional development decisions must be made in order to accommodate energy center impacts. In the absence of regional agencies, states should use the above information, regarding local capacity to respond to change, to channel NEC-induced growth into the areas best able to cope with it. State agencies are better equipped than federal policymakers to make these decisions because of their presumed greater sensitivity to intra-regional cultural patterns. Or the state may create a special planning and development commission to act as a surrogate regional government.

State planning assistance will also be required for impacted localities. State officials can help localities implement needed construction and services programs which are unfamiliar to local citizens.

States should also be aware of opportunities to act as liaisons between federal and local governments agencies. State entree's into the federal system can be very helpful in current red tape for overwhelmed localities.

Federal

Nuclear energy centers are an example of the federal government initiating change faster than the rate at which states and localities can respond. Therefore, just as in the case of onshore impacts from offshore drilling, a strong case can be made for federal provisions of state and local impact assistance to promote regional planning may prove to be models for appropriate new programs.

Federal agencies possess the necessary expertise to aid localities in planning and resolving technical problems. One agency shoud be designated to

coordinate federal imputs into an impacted region--few rural localities are capable of simultaneously dealing with a multitude of federal entities.

Impacted areas would also benefit from a federal (i.e., Nuclear Regulatory Commission) decision to continue requiring that detailed socioeconomic impact mitigation strategies be included in environmental statements.

Perhaps the most important role of the federal government in relation to energy center implementation is in the realm of "risk-sharing". Communities surrounding an N.E.C. will be asked to undergo massive changes in order to upgrade the national energy supply system. Yet there is a significant chance that these localities may actively prepare for a changed existence which never occurs. The energy center project would be abandoned for reasons relating to safety, technical logistics, or transformed societal values after the community had already committed large amounts of capital. Therefore, in order to encourage the early responses which are imperative for effective growth management, the federal government should "insure" those initial expenditures. That is, if a previously approved energy center project is abandoned communities should be "bailed-out" for the front-end expenses they incurred.

FOOTNOTES

[1]U.S. Nuclear Regulatory Commission, Nuclear Energy Center Site Survey--1975 (Washington, D.C.:NRC, 1975), Volume IV, pp. 5-15 and 5-16.

[2]Berkshire County, Massachusetts Regional Planning Commission, Evaluation of Power Facilities: A Reviewer's Handbook (prepared under contract to H.U.D.) (Springfield, Virginia: NTIS, 1974) p. 185.

[3]Walter Isard, Methods of Regional Analysis (Cambridge: M.I.T. Press, 1960) p. 192.

[4]Hugh Nourse, Regional Economics (New York: McGraw-Hill, 1968) p. 163.

[5]see Robert J. Havighurst and H. Gerthon Morgan, The Social History of A War Boom Community (New York: Longman's, Green, and Company, 1951).

[6]U.S. Department of Housing and Urban Development, Regional Growth from Energy Projects (Washington, D.C.: GPO, 1976).

[7]Nuclear Regulatory Commission, NECSS-'75, Vol. IV, p. 2-12.

[8]Gerald Breese, et.al., The Impact of Large Installations on Nearby Areas (Beverly Hills: Sage Publications, 1965) pp. 483-484.

[9]Ibid. p. 589.

[10]Institute for Research in Social Science, University of North Carolina, In the Shadow of a Defense Plant--A Study of Urbanization in Rural South Carolina, excerpted in Breese, p. 544.

[11]U.S. Nuclear Regulatory Commission, Proceedings of the 1975 Federal-State Conference on Power Plant Siting (Washington, D.C.:NRC, 1975) p. 88.

[12]Battelle Memorial Institute, Identification and Management of Economic and Social Impacts of Nuclear Energy Centers--A Preliminary Analysis (prepared under contract to the NRC) (Seattle: Human Affairs Research Center, 1975) p. 47.

[13]Berkshire, Mass. Regional Planning Commission, Evaluation of Power Facilities, p. 10.

[14]Howard, Needles, Tammen and Bergandoff; "Review of Socioeconomic Impacts of the Calvert Cliffs Nuclear Power Plant on Calvert County, Maryland and Comparisons with Kent County, Maryland" (Unpublished report prepared for the Maryland Power Plant Siting Program, Department of Natural Resources, January 1975), p. 11.

[15]U.S. Nuclear Regulatory Commission, Final Environmental Statement--Hartsville Nuclear Plants of the T.V.A. (Washington, D.C.: NRC, June 1975), p. 4-16.

[16]U.S. Federal Energy Administration, Siting Energy Facilities at Camp Gruber, Oklahoma--Volume III--Socioeconomic Impacts (Washington, D.C.: FEA, 1975) p. 3.

[17]Harbridge House, Inc. "The Social and Economic Impact of a Nuclear Power Plant Upon Montague, Mass. and the Surrounding Areas" (unpublished report prepared for the town of Montague, November, 1974)

[18]Battelle, Economic and Social Impacts of Nuclear Energy Centers, p. 22.

[19]Breese, p. 590.

[20]C.R. Cavenaugh, "Community Development Implications of Energy Complex Construction" (Denver, Stone and Webster Engineering Corporation, 1975) p. 3.

[21]Berkshire, Mass. Regional Planning Commission, Evaluation of Power Facilities, p. 178.

[22]Howard, et. al., "Socioeconomic Impacts of Calvert Cliffs", p.5.

[23]Berkshire, Mass. Regional Planning Commission, Evaluation of Power Facilities, p.178.

[24]National Association of Counties, Preparing for Anticipated Growth--Greene County, Pennsylvania (prepared under contract to FEA) (Washington, D.C.: NACo, 1976) p.10.

[25]Federation of Rocky Mountain States, Energy Development in the Rocky Mountain Region: Goals and Concerns (Denver: FRMS, 1975) p.66.

[26]John S. Gilmore,"Boom Towns May Hinder Energy Resource Development" Science (February 13, 1976, Vol. 191, pp. 535-540) p. 540.

[27]NRC, Hartsville Environmental Impact Statement, p.4-21.

[28]Berkshire,Massachusetts Regional Planning Commission, Evaluation of Power Facilities, p.199.

[29]NRC, Conference on Power Plant Siting,p.13.

[30]Berkshire, Mass. Regional Planning Commission, Evaluation of Power Facilities, p. 181.

[31]National Association of Counties, NACo Case Study Number One: Kaiparowits New Town Project, Kane County, Utah (under contract to FEA) (Washington, D.C.: NACo, 1975) p. 1.

[32]see J. Wicks et.al., Impact of Libby Dam Construction on the Economy of Lincoln County, Montana, Bureau of Business and Economic Research (Missoula, Montana: University of Montana, 1969).

[33]U.S. Federal Energy Administration, Siting Energy Facilities at Camp Gruber, Volume III, pp.62-63.

[34]see Breese, The Impact of Large Installations on Nearby Areas; and Oak Ridge National Laboratory, Citizen Views About the Proposed Hartsville Nuclear Power Plant(Oak Ridge: 1975).

[35]Breese, et. al. The Impact of Large Installations, p. 141

[36]J.P. Sterba, "Town Scarred by Oil Boom Waits Apprehensively for Miners" New York Times; Section II, p.1, April 11, 1974.

[37]Berkshire Regional Planning Commission, Evaluation of Power Facilities, p.169.

[38]Ibid.

[39]Ibid. p. 177.

[40]Florida State University, A Report on the Institutional Capacity of Three Communities in the Cape Kennedy Area (Tallahassee: Institute for Social Research, 1965) p.7.

[41]Breese, et.al., The Impact of Large Installations, p. 588.

[42]Gilmore, "Boom Towns" in Science, p.536.

[43]Federation of Rocky Mountain States, Technical Paper 700-74-B A Typical Boom Area in the Rocky Mountain Region (Denver: FRMS, 1974) p.3.

[44]FRMS, Energy Development in the Rocky Mountain Region, p.75.

[45]Gilmore and Duff, Boom Town Growth Management, p. 12.

[46]Ibid.

[47]Ibid. p.11.

[48]Gilmore, "Boom Towns", Science, p. 539.

[49]Berkshire Regional Planning Commission, Evaluation of Power Facilities, p.170.

[50]Ibid.

[51]U.S. Nuclear Regulatory Commission, A Confirmatory Assessment of Local Social and Economic Impacts from Nuclear Plant Construction: A Case Study of the Arkansas Nuclear I, Units 1 and 2 (Washington, D.C.: NRC, 1975) p.10.

[52]Battelle Pacific Northwest Laboratories, Technical, Environmental and Socioeconomic Factors Associated With Dry-Cooled Nuclear Energy Centers (Richland: Battelle, 1976) p.226.

[53]Berkshire, Mass. Regional Planning Commission, Evaluation of Power Facilities, p. 175.

[54]see Isard, Methods of Regional Analysis .

[55]these solely suggestive figures are derived from site evaluations such as: Battelle, Dry-Cooled NEC's; Brookhaven, Preliminary Assessment of a Hypothetical Nuclear Energy Center in New Jersey.

[56]Battelle, Dry-Cooled NEC's, p.234.

[57]Ibid.

[58]Berkshire, Mass. Regional Planning Commission, Evaluation of Power Facilities, p.173.

[59]Brookhaven National Laboratory, Preliminary Assessment of a Hypothetical Nuclear Energy Center in New Jersey (Upton, Long Island: BNL, 1975) pp.212-213

[60]Breese, et.al., The Impact of Large Installations, p. 359.

[61]Howard, et.al., "Socioeconomic Impacts of Calvert Cliffs", p. 4.

[62]Brookhaven, Hypothetical Assessment of an NEC in New Jersey,

[63]Battelle, Dry-Cooled NEC's, p.118.

[64]U.S. News and World Report, "Inside an Atomic Power Plant--How Dangerous?" (March 15, 1976) pp. 61-64.

[65]National Environmental Policy Act, Section 101 (b) (5).

[66]see Gilmore and Duff, Boom Town Growth Management, Chapter 5.

[67]Ibid, p.72.

[68]Battelle, Economic and Social Impacts of NEC's, p.195.

[69]National Association of Counties, Preparing for Anticipated Growth, p.18.

[70]Breese, et.al., The Impact of Large Installations, p.161.

[71]Elizabeth Peelle,"Social Effects of Nuclear Power Plants", in C.P. Wolf, ed. Social Impact Assessment, 1974, p. 174.

[72]Battelle, Economic and Social Impacts of NEC's, p.57.

[73]U.S. Nuclear Regulatory Commission, Final Environmental Statement--Hartsville.

[74]Oak Ridge National Laboratory, Citizens Views About the Proposed Hartsville Nuclear Power Plant--A Preliminary Report of Potential Social Impacts (ORNL-RUS-3) (Oak Ridge: 1975) p.vii.

[75]see Battelle, Economic and Social Impacts of NEC's.

[76]Ibid. p.89.

[77]Gilbert White and Gottfried Lang, "Community Mobilization for Adaptation to Change in Rapid Growth Areas" in FRMS, Energy Development in the Rocky Mountain Region, p.80.

[78]Ibid.

[79]Ibid., pp.77-79.

[80]Ibid., p. 75.

[81]Havighurst and Morgan, A War Boom Community, p.xiii.

[82]Marvin F. Bressler and Charles F. Westoff, "Leadership and Social Change" Social Forces , Volume 32, pp.235-243 (March 1954).

APPENDIX A

Policy mechanisms for Implementing Growth Management

from Boom Town Growth Management, by John Gilmore and Mary Duff

Means of Affecting the Rate of Basic Capital Investment†

Deterrents	Encouragements
■ plant site planning laws ■ plant site control laws ■ industry specific taxes[a] ■ policies or taxes encouraging out-of-region processing of resources ■ impact statements ■ permit or impact fees[a] ■ zoning	■ industrial development bonds ■ loan guarantees ■ industry-specific accelerating depreciation ■ industry-specific income tax credits ■ government construction of plants or facilities

Means of Affecting the Rate of Induced Capital (Local Service) Investment

Deterrents	Encouragements
■ low bonding limits ■ low assessment ratios ■ high land prices ■ lack of state or federal financial aid	■ public facility grants ■ public facility loans ■ exemptions or increased bonding limits ■ "pay-as-you-grow" tap fees and permit fees ■ state development authority (i.e., Wyoming Community Development Authority) ■ company assured housing ■ joint powers (multi-government cooperation) legislation ■ local flexibility in taxations, including income taxes ■ industry loans to local service entities ■ industrial development bonds for local service activities, including retailing ■ state revenue sharing ■ impact fees ■ low interest housing purchase loans

Means of Affecting Communication Among Sectors

Deterrents	Encouragements
■ traditional industry views that most information is proprietary ■ closed or nonparticipative local government budgeting	■ joint industry-government problem-solving (the Sweetwater County Priorities Board) ■ industry and citizen participation in local government budget preparation
■ inadequate local government planning ■ uncertainty about federal land and resource policies ■ inadequate coordination and cooperation among units of government	■ joint industry-government local planning staff ■ voluntary industry disclosure of tentative investment and site planning ■ legislation requiring environmental impact and community impact statements ■ industrial site control legislation requiring information ■ industrial site control legislation requiring justification ■ aggressive press coverage of local economic and political activities

Means of Affecting Resource Use

Deterrents	Encouragements
■ exclusionary zoning ■ preservation of agricultural or other existing uses by zoning or tax ■ emission and effluent regulations	■ permissive zoning ■ release of public lands ■ easing the transfer of water rights and the acquisition of uncommitted water
■ complex source and nondegradation regulations for air quality ■ siting controls ■ use quotas (grazing or logging public lands)	■ "industrial development" standards of air quality ■ differential tax rates, favoring production of certain minerals or qualities of minerals ■ control of annexations, municipal incorporations and formation of special districts

Increase the Supply and Utilization of Labor

Deterrents	Encouragements
■ limit local service investment so that community is relatively unattractive ■ fail to maintain intangibles of the quality of life	■ develop and maintain attraction capability, e.g., good wages and career opportunities, quality of life sufficient to increase population and labor force
■ comparatively lower wage scales for local government employees than for mining, construction	■ establish training programs ■ encourage local affirmative action activity ■ maintain day care centers to encourage women to participate ■ offer relocation allowances ■ award longevity job seniority bonuses ■ offer competitive job security or income security

Affect the Demand for Labor

Deterrents	Encouragements
■ encourage off-site construction to be done outside area ■ discourage processing or conversion of extracted minerals ■ limit expansion of local service employment by discouraging induced capital investment	■ encourage local mineral processing and conversion ■ encourage induced capital investment

Accommodating and Retaining Population

Deterrents	Encouragements
■ failure to encourage (opposite column) and failure to manage growth during boom are major deterrents	■ adequate wages and career opportunities ■ housing at affordable prices, lease-purchase agreements with employer financing ■ health services ■ adequate education, recreation, leisure time activities ■ safety and security ■ newcomer integration into the community ■ land continuingly available for housing to avoid monopolistic pricing ■ easy access to participation in community affairs

APPENDIX B

A Sample Set of Social Indicators

from Battelle Institute, Identification and Management of Economic and Social Impacts of Nuclear Energy Centers--A Preliminary Analysis

1. Demographic

   a. Population size (birth, death and migration rates)
   b. Population density
   c. Age and sex composition
   d. Ethnic composition (race, nationality, and religious)
   e. Educational composition
   f. Marriage and divorce rates
   g. Urbanization rate

2. Economic

   a. Business and industrial composition of the community
   b. Local retail and wholesale sales
   c. Rates of business starts and failures
   d. Dominant economic forces in the community
   e. Local tax rates
   f. Local insurance rates
   g. Cost of living in the community
   h. Distribution of labor-force skills
   i. Employment and unemployment rates
   j. Occupational distribution of the work-force
   k. Income levels and distribution
   l. Job satisfaction

3. Habitat

   a. Amount, type, and quality of housing
   b. Prevailing real estate prices
   c. Ethnic and social class segregation of housing
   d. Residency duration and mobility
   e. Land use patterns (housing, commercial, transportation, etc.)
   f. Utility capacities (electricity, water, gas, telephones)
   g. Extent and quality of streets and parking facilities
   h. Adequacy of public transportation

4. Services

   a. Number, types, and sizes of schools
   b. Budget and quality of the educational system
   c. Extent and quality of facilities and services for children, youth, and the elderly
   d. Number and types of medical personnel
   e. Extent and quality of hospital facilities
   f. Number of lawyers and extent of legal services
   g. Extent of quality of police and fire services
   h. Extent and quality of corrections facilities and services (drug, alcohol, delinquency, criminal)
   i. Extent and quality of counselling and mental health services
   j. Extent and adequacy of welfare services

5. Organizational

   a. Family living patterns (singles, couples, families, etc.)
   b. Extent of informal social interaction
   c. Extent of neighborhood organization and activities
   d. Number, types, and participation in voluntary associations
   e. Number and types of churches
   f. Socioeconomic class structure
   g. Ethnic organizations and activities
   h. Extent of serious community conflict
   i. Public satisfaction with the community

6. Cultural/recreational

   a. Extent of local mass media (newspapers, radio and TV stations)
   b. Number of libraries, museums, cultural centers, etc.
   c. Number of movie theaters
   d. Extent of other commercial recreational facilities
   e. Extent of public parks and similar areas
   f. Extent of community sports and recreational facilities and programs
   g. Extent of neighborhood centers and programs

7. Personal

   a. Physical health/illness rates
   b. Crime and delinquency rates
   c. Alcoholism and drug abuse rates
   d. Suicide rate
   e. Extent and distribution of poverty
   f. Extent of personal psychological problems
   g. Mental illness rates
   h. Personal satisfaction with quality of life

8. Political

a. Size, structure, and budget of local government
b. Public satisfaction with local government
c. Strengths of local political parties
d. Strength and structure of informal community power system
e. Relationships between local and state and federal governments
f. Citizen participation in politics (voting, communicating, acting)
g. Protection of civil rights
h. Extent and adequacy of local courts
i. Extent and adequacy of planning capabilities and activities

BIBLIOGRAPHY

Argonne National Laboratory. Nuclear Energy Center, Upper St. Lawrence Region, N.R.C. sponsored, October, 1975.

Baldwin, Pamela L. and Malcolm Baldwin. Onshore Planning for Offshore Oil. Washington, D.C.: The Conservation Foundation, January, 1975.

Battelle Memorial Institute. Identification and Management of Economic and Social Impacts of Nuclear Energy Centers. A Preliminary Analysis. Prepared under contract to the United States Nuclear Regulatory Commission by Human Affairs Research Centers, September, 1975.

Berkshire County Massachusetts Regional Planning Commission. Evaluation of Power Facilities: A Reviewer's Handbook (Prepared under contract to H.U.D.) Springfield, Va.: NTIS, 1974.

Berry, Brian, J.L. "A Commuting Pattern and Labor Market Participation ". Growth and Change. Vol. I, Number 4.

Bjornstad, D.J. State and Local Fiscal Impacts Associated with Nuclear Energy Centers: Some Initial Considerations. Oak Ridge National Laboratories, 1976.

Breese, G., et al. The Impact of Large Installations on Nearby Areas. Sage Publications, 1965.

Briscoe, Andy: et al. Tax Lead Time Study. Colorado Governor's Committee on Oil Shale Environmental Problems, 1975.

Brookhaven National Laboratory. Preliminary Assessment of a Hypothetical Nuclear Energy Center in New Jersey. Upton, Long Island: BNL, NON, 1975.

Cavenaugh, C.R. "Community Development Implications of Energy Complex Construction" Denver: Stone and Webster Engineering Corporation, 1975.

Chapin, F.S., Jr. et al. In the Shadow of a Defense Plant: A Study of Urbanization in Rural South Carolina. University of North Carolina Institute for Research in Social Science., 1954.

Cope, David F. "Nuclear Energy Centers: A Prime Element in Reactor Siting." Nuclear Safety. Volume 16, Number 3, May-June 1975.

Federation of Rocky Mountain States. Energy Development in the Rocky Mountain Region: Goals and Concerns. July, 1975.

Federation of Rocky Mountain States--Technical Paper 700-74-B, A Typical Boom Area in the Rocky Mountain Region. Denver: FRMS, 1974.

Florida State University, Tallahassee. Institute of Governmental Research. Community Satisfaction and Community Involvement in Brevard County. Washington, D.C.:NASA, 1965.

General Electric Company. Center for Energy Systems. Washington D.C., G.E., 1975.

Gilmore, Jack and Marty Duff. Boom Town Growth Management. Denver Research Institute, 1975.

Gilmore, John S. "Boom Towns May Hinder Energy Resource Development." Science, 13 February, 1976. Vol. 191, pp. 535-540.

Gray, Irwin. "New Industry in a Rural Area." Monthly Labor Review. Vol.92, No.6, June 1969.

Havighurst, Robert J. and H. Gerthon Morgan. The Social History of a War Boom Community. Longmans Green and Co., New York, 1951.

Higgins, Benjamin. Economic Development. New York: W.W. Norton and Company, 1968.

Howard, Needles, Tammen and Bergandoff. "Review of Socio-economic Impacts of the Calvert Cliffs Nuclear Power Plant on Calvert County, Maryland, and comparisons with Kent County, Maryland." unpublished report prepared for the Maryland Power Plant Siting Program, Dept. of National Resources, January 1975.

Institute for Research in Social Sciences, Development of Guidelines for Urbanization in Rural Areas Affected by Large Industrial Plants. Chapel Hill: North Carolina University Press, 1952.

Institute for Research in Social Science. In the Shadow of a Defense Plant. Chapel Hill: University of North Carolina, 1954.

Institute for Urban Studies. Accelerated Urban Growth in a Metropolitan Area. Philadelphia: University of Pennsylvania Press, 1954.

Isard, Walter. Methods of Regional Analysis. Cambridge: M.I.T. Press, 1960.

Kleinsorge, Paul L. The Boulder Canyon Project. Stanford: Stanford University Press, 1941.

Leistritz, F.L. et al. "Projecting Public Service Effects of a New Industry in a Rural Area." Paper presented at a meeting of the American Agricultural Economics Association, August 1975.

Lynch, John E. Local Economic Development after Military Base Closures. Praeger: New York, 1970.

McKee, David L. ; Robert D. Dean, and William H. Leahy, eds. Regional Economics. New York: Free Press, 1970.

Meier, R.L. "The Social Impact of a Nuplex". Bulletin of Atomic Scientists. Volume 25, March, 1969, pp.16-21.

National Association of Counties, N.A.C. Case Study No.1: Kaiparowits New Town Project, Kane County, Utah. (under contract to F.E.A.) Washington, D.C. NACO, 1975.

National Association of Counties. Preparing for Anticipated Growth--Grenne County, Pennsylvania (prepared under contract to FEA) Washington, D.C.: NACO, 1976.

National Governor's Conference, Center for Policy Research and Analysis. Some Public Finance Aspects of Nuclear Energy Centers. Washington, D.C.:National Governor's Conference, 1976.

National Governor's Conference Energy Program. Power Parks from the State Perspective. 1976.

Nourse, Hugh O. Regional Economics. New York: McGraw Hill, 1968.

Oak Ridge National Laboratory. A Comparison Between Dispersed Nuclear Power Plant and a Nuclear Energy Center at a Hypothetical Site on Kentucky Lake,Tennessee. ORNL-TM-5014 NRC sponsored October 1975.

Oak Ridge National Laboratory Citizens Views About the Proposed Hartsville Nuclear Power Plant-A Preliminary Report of Potential Social Impacts. ORNL-Rus-3, May, 1975 under contract to ERDA.

Pennsylvania University Regional Science Department. Regional Economic Impact of Nuclear Energy Centers.prepared for the N.R.C., September 30, 1975.

Peterson, Bill. "Gaithersburg Change is...Courtesy of Uncle Sam". Washington Post, page C1, November 13, 1975.

Richardson, H.W. Regional Growth Theory. New York: Wiley, 1973.

Siebert, Horst. Regional Economic Growth: Theory and Policy. Pennsylvania: International Textbook Company, 1969.

Starr, Chauncey. "Social Benefits versus Technological Risk", Science Magazine (September, 1969).

Sterba, J.P. "Town Scarred by Oil Boom Waits Apprehensively for Miners." The New York Times. Section 2, p.1, April 11, 1974.

Sterba, J.P. "Worry Mounts that Rockies Face Pollution and Crowds." The New York Times.p. M31, September 26, 1974.

Sundborg, George. Hail Columbia. New York: Macmillan and Company, 1954.

U.S. Atomic Energy Commission. Evaluation of Nuclear Energy Centers. WASH-1288. Washington, D.C.: AEC, January 1974.

U.S.Department of Housing and Urban Development. Rapid Growth from Energy Projects. Washington, D.C.: HUD, 1976.

U.S. Environmental Protection Agency. The Costs of Sprawl. Washington, D.C.: EPA, 1975.

U.S. Federal Energy Administration. Siting Energy Facilities at Camp Gruber, Oklahoma--Vol.III, Socioeconomic Impacts. Washington, D.C.: FEA, 1975.

U.S. Federal Energy Administration. Siting Energy Facilities at Glasgow Air Force Base. Washington, D.C., FEA, 1975.

U.S. Nuclear Regulatory Commission. A Confirmatory Assessment of Local Social and Economic Impacts from Nuclear Plant Construction: A Case Study of the Arkansas,Nuclear One, Units I and II, 12/ 17/75.

U.S. Nuclear Regulatory Commission. A Confirmatory Assessment of Local Social and Economic Impacts from Nuclear Plant Construction: A Case Study of the McGuire Nuclear Station, Units I and II, Washington, D.C. N.R.C., October, 1975.

U.S. N.R.C.- Final Environmental Statement-Hartsville Nuclear Plants of the TVA. June, 1975. N.R.C.

U.S. Nuclear Regulatory Commission. Nuclear Energy Center Site Survey. 1975, N.R.C., Washington, D,C.

U.S. Nuclear Regulatory Commission. Nuclear Regulatory Commission Issuances. April 1976. TVA. Hartsville Nuclear Plant.

U.S. Nuclear Regulatory Commission. Proceeding of the 1975 Federal-state Conference on Power Plant Siting. Washington, D.C.:N.R.C., 1975.

U.S. News and World Report, "Inside an Atomic Power Plant-- How Dangerous?" March 15, 1976; pp.61-64.

Wagstaff, H.R. "Employment Multipliers in Rural Scotland" Scottish Journal of Political Economy, Volume 20, pp.239-262.

NUCLEAR ENERGY CENTERS:
EQUITY CONSIDERATIONS RELATING TO
TAXATION AND REVENUE DISTRIBUTION

Terry A. Ferrar, Ph.D.

Frank Clemente, Ph.D.

Alan B. Brownstein, M.A.

Executive Summary

This research examines the major equity considerations involving the construction and operation of nuclear energy centers (NEC) in the United States. The concept of "equity" is analyzed from a sociological, sociopsychological, and socioeconomic perspective. Using a generalized concept of equity, utility taxation and revenue distribution policies from the states of Pennsylvania, New York and New Jersey are examined, and a preliminary assessment is made concerning the success of these state programs in resolving the inequalities precipitated by energy facility siting.

The general conclusions of this investigation are as follows:

(1) The utility taxation and revenue distribution programs in these three states differ distinctly both in terms of administrative design and ultimate net revenue flows;

(2) The inherent inequities associated with energy facility construction and operation tend to be accentuated by present utility tax-revenue distribution schemes; and

(3) The construction and operation of an NEC in these states would intensify the already severe inequities that persist relevant to conventional energy facility construction and operation.

In order to resolve these equity concerns, this study recommends the implementation of a state-sponsored intergovernmental assistance program. Specifically, to equilibrate the benefit and cost profiles associated with the siting of NEC's, a revenue transfer program, based upon the Pigouvian concept of gainers compensating losers, should be operationalized to compensate for the disproportionate local burden.

However, the potential impacts of an NEC are so situational-specific--both site and facility--that a standardized approach involving a predetermined formula is infeasible. Until the "state-of-the-art" with respect to socioeconomic impact forecasting is sufficiently advanced to permit formula specification, administrative judgment must be substituted in order to operationalize the intergovernmental revenue transfers required for resolving the equity problem.

TABLE OF CONTENTS

	Page
Executive Summary.	90
CHAPTER 1 THE IMPLICATIONS OF THE PENNSYLVANIA ENERGY PARKS CONTROVERSY FOR THE NUCLEAR ENERGY CENTER CONCEPT. . .	94
Pennsylvania: Electricity versus Volkswagens . .	97
Discrepancies in Official Reaction.	97
Official's Perception of Opposition	101
Poor Reputation of Energy Development	102
Equity Issues	103
Summary	106
Footnotes	108
CHAPTER 2 UTILITY TAX REVENUE AND DISTRIBUTION PROGRAMS: CASE STUDIES OF THREE STATES.	109
Pennsylvania	110
Legislative Background.	110
Implementation Procedures	112
Experience.	114
Proposed Modifications to Existing Statutes . . .	115
New Jersey	118
Legislative Background.	118
Implementation Procedures	119
Experience.	121
Proposed Modifications to Existing Statutes . . .	125
New York	127
Legislation and Implementation Procedures	127
Proposed Modification to Existing Statutes. . . .	128
Footnotes	129

	Page
CHAPTER 3 TAXATION POLICIES AND PUBLIC PERCEPTION OF EQUITY. . .	132
Revenue Projections for an NEC.	133
Pennsylvania vis-a-vis New Jersey	135
Surrounding Area Issue.	141
Conclusion.	142
Footnotes	145
CHAPTER 4 POLICY RECOMMENDATIONS: THE NEED FOR REALISM AND FLEXIBILITY.	146
Recommendations	153
Footnotes	156

CHAPTER 1

THE IMPLICATIONS OF THE PENNSYLVANIA ENERGY PARKS CONTROVERSY FOR THE NUCLEAR ENERGY CENTER CONCEPT

The ideological commitment of Americans to industrial growth has been well documented by social scientists.[1] The direct correlation between industrialization and increases in the standard of living has achieved almost axiomatic status in the research literature. In the United States, this tendency to equate industrial development with progress has dominated the cultural milieu of the society. In essence, industrialization and its accompanying accouterments have typically been viewed as panaceas to social and economic ills.[2]

One area where faith in industrial development has been most apparent is in the search of small towns and rural communities for new industry. As is well known, such nonmetropolitan areas suffered serious population declines via out-migration of young adults in the 1950's and 1960's. This mass exodus of young persons from small communities prompted the President's Commission on Rural Poverty to title their report The People Left Behind.[3] Some years earlier, the problem of individuals in the productive age categories leaving small towns for the city was even more colorfully depicted by a Wisconsin farmer. "Rural America," he stated, "is like a fished out pond, full of bull heads and suckers."*

*At this point it should be emphasized that the decline of rural areas has not been eliminated by the recent "back to the country" movement detailed in the popular press. Almost three decades of steady outmigration of young adults has created voids in rural areas which cannot be filled by the much heralded but numerically minor outmigration of metropolitan residents.

Given this background, it is not surprising that many small towns have attempted to counter economic decline by attracting industries. As Kaldor and Dahlke have pointed out:

> Rural industrialization is widely discussed as a means of helping solve the problems . . . of the rural community . . . . Communities in every nook and corner of the nation are competing for a piece of the industrial pie.[4]

This competition for industry often becomes very intense. There are over 14,000 organizations in the United States actively engaged in promoting industrial development for the various geographic and political subdivisions they represent.[5] In Iowa alone, a recent survey of 115 small towns revealed 284 separate groups active in local industrialization efforts.[6]

Public opinion polls taken in small towns indicate that the search for industry is not merely a pet project of the local Chamber of Commerce, but rather has extremely strong grass roots support. In a rural Illinois county, for example, a survey of the local population revealed 86 percent of the residents were favorable to industrial development.[7] A similar survey in Ohio indicated 78 percent of the population were favorable to new industry.[8] And a 1976 survey of three nonmetropolitan counties in Pennsylvania indicated 91 percent of local adults supported new industry.[9] A few years earlier, a national survey of bankers in small towns indicated that these local economic leaders regarded lack of industry as the number one problem of their respective communities.[10]

In sum, then, popular support for industrial development has been extremely strong in the United States in general and in small towns

and rural communities in particular. In recent years, however, there has been a tendency for some segments of communities to support development on an "industry specific" basis. Whereas once virtually all citizens were willing to accept any new industrial plant, now there is a tendency for some industrial development projects to face strong, and often insurmountable, opposition from special interest environmental groups.

The energy industry is one of the leading "victims" of this increasing tendency for some segments of the community to look askance at new development. Energy projects, whether they be fossil-fired plants, hydroelectric facilities, strip mines or nuclear energy centers, face intense hostility from a highly vocal and articulate coterie of special interest groups loosely defined as "environmentalists." These groups, by participating in public hearings and acting as intervenors, have successfully stalled or killed a number of energy development projects around the country.[11]

The discrepancy between overt support for new industry and the apparent hostility toward energy development is a contradiction which must inevitably be resolved in the analysis of any type of energy facility. The following example from Pennsylvania highlights the disparate reactions likely to emerge over manufacturing facilities vis-a-vis energy development.

Pennsylvania: Electricity versus Volkswagens

The uproar over the Energy Park proposal in Pennsylvania during 1975 has been well documented in two other papers prepared for the panel and will not be rehashed here. Let it suffice to say that dozens of local organizations and public officials took stands opposing an Energy Park for their area. Legislators and other elected officials tumbled over one another in their anxiety to get to the microphone and denounce this "monster perpretrated on us by the electric companies." A statement by State Senator Franklin Kury was typical of the sentiment of public officials:

> Energy parks would affect the community . . . our townships could become utility company townships and our county a utility company county . . . I say to the power companies don't force an energy park on [these] counties and municipalities . . .

Now, let us contrast the overt reaction to the Energy Park concept with that of the Volkswagen plant planned for the Laurel Highlands (a neighboring portion of the Highlands had also been proposed as a site for an Energy Park).

In early 1976, when the controversy over the energy park proposal was still swirling in some counties, Governor Shapp announced that intensive negotiations with Volkswagenwerk AG of West Germany had resulted in a preliminary agreement under which the German auto maker would locate a major production facility near New Santon (population 2,500) in the Laurel Highlands of Westmoreland County. The plant would create 5,500 jobs. (The energy park, it will be remembered, had been projected by Gilbert Associates to create 7,560 new jobs.)

The decision of Volkswagen to come to Pennsylvania was seen by Governor Shapp as a great boost for a lagging part of the state. Praise was heaped on Governor Shapp from all quarters. He had played a direct part in the negotiations and had even gone to Germany to deal with Volkswagen officials. Editorial writers around the state depicted the feat as the "leading accomplishment of the Shapp administration."

In order to attract Volkswagen the state offered some major inducements including some significant tax concessions, a $135 million loan, $30 million for railroad facilities and a $3.3 million job training program. The company is required to outlay $50 million for start-up costs. On September 15, 1976, Governor Shapp presented Volkswagen with the first part of an Industrial Development Loan. Annual interest is 4 percent.

At the present time, the Westmoreland County Planning Department is busily engaged in preparing for the influx of construction workers for the Volkswagen facilities and in reviewing the proposals for shopping centers, residential complexes, theaters and bowling alleys which have recently been filed. Less than a year ago (November 25, 1975) the Westmoreland County Planners issued the following statement on energy parks:

> Laurel Highlands is an . . . area of mountain beauty . . . Detrimental effects will be felt by all who live in and visit the region . . . an energy park . . . will destroy the tourist business . . . Any revenue generated by an energy park would be absorbed by the cost to the region.

Discrepancies in Official Reaction

At this point, the logical question becomes "Why was reaction, especially reaction by public officials, characterized by extreme hostility to the energy park proposal but strong support for the Volkswagen plant? The answers to this question clearly have profound implications for any analysis of the viability of energy centers in other parts of the country. Pennsylvania has often been called a microcosm of the United States as a whole. The Commonwealth includes massive population centers, small towns and rural areas. Industrial as well as agricultural interests are in juxtaposition. In short, it is not unreasonable to hypothesize that social, political and economic events in Pennsylvania are often isomorphic to the country as a whole.

Given this line of reasoning, the Pennsylvania situation offers insights into potential reaction to energy centers in other states. In effect, the Pennsylvania controversy was a field experiment for the Energy Center concept. As such, it provides a unique data base. Other discussion of energy centers has been forced to speculate on what public reaction would "probably be" if an NEC were proposed in a given geographic area. For example, the NRC's Nuclear Energy Center Site Survey regularly uses phrases such as "it is expected" or "probably will be" in discussing public views of the concept. The Pennsylvania data make us much less dependent upon this educated guess approach. The Pennsylvania data do not provide all the answers, but they do enable us to identify the questions with a certain degree of confidence. Given the speculative approach of virtually all other discussions of the subject, we view our empirically oriented analysis as a major step forward in the evaluation of the NEC concept.

In a previous paper for the Energy Centers panel we indicated and discussed a series of criticisms of the Energy Park concept which emerged from citizens and groups on the local community level. The reasons for opposition ranged from fear of nuclear power to concern over the local trout stream to distrust of the electric utilities.

The present paper takes this earlier discussion as a point of departure in moving to a more macro level of analysis. Here we focus on some of the more generalizable aspects of the Pennsylvania situation. Our specific goal is to depict the implications of the Pennsylvania case for other states studying the energy center concept as well as for relevant officials of the federal government.

Perhaps the major stumbling block for the Energy Park proposal in Pennsylvania pertained to the virtually unanimous hostility from public officials, both elected and appointed. While the Volkswagen plant had vocal and enthusiastic supporters ranging from the Governor himself to borough officials in New Stanton, the Energy Park concept generated only animosity.

Our analysis of the available data strongly suggests that three factors were responsible for this disparate reaction of public officials. While these factors are not exhaustive and not mutually exclusive, it is reasonable to conclude that they account for the bulk of the variance in why officials were opposed to energy parks but receptive of other industrial development (e.g., Volkswagen plants):

(1) Public officials consistently perceived their constituents as being opposed to Energy Parks.

(2) Energy Parks suffered from the increasingly bad reputation of energy development in general.

(3) Perceived inequities made Energy Parks appear as a burden rather than boon to the community.

Officials' Perception of Opposition

Public input meetings spotlighted negative and opposition to the Energy Parks concept. The many hostile statements made at the meetings conveyed the impression that there was widespread opposition to the concept. Public hearings provided a forum for "anti" groups to denounce various aspects of the proposal.

For the Volkswagen plant, however, no public hearings were called. It is quite likely that some groups might have opposed the plant but the absence of public hearings, coupled with the fact that local residents were not included in the negotiations and decision making process, stultified any potential reaction.

The key point, then, is that while the Energy Park proposal was called to front stage across the state, the Volkswagen decision was made behind the scenes. Some negotiations were even conducted in Germany. The public spotlight killed the Energy Park concept, but it never was even turned on the Volkswagen decision.

Objective assessments of public opinion were not available to compare to the results of the subjective data from the public hearings. Thus, officials had no "hard" data to compare to the public input results.

It is generally recognized that the results of public meetings are inherently biased. This bias, however, cannot be seen as a weakness of the process. For public meetings are designed to generate unrepresentative results. The problem in the Pennsylvania case resulted not from the fact that the public input was biased, but rather from the failure of government officials to supplement the input with scientific evaluations of public opinion. In the absence of such objective data decision were partially made on the basis of biased input. Put another way, it was impossible to enter non-existent survey data into the decision making process.

In the Volkswagen case, there was no need to balance public input hearings with scientific surveys. Since no hearings were held, the question of whether the general public was pro or con was never seen as a major issue. Given the dominant cultural perspective that industrial growth is beneficial, it was generally assumed that the bulk of the population was in favor of the plant.

Poor Reputation of Energy Development

Many local officials were familiar with horror stories concerning the community disruption which has been rumored to accompany energy development. They had read Wall Street Journal type articles detailing the suicides, depression and alcoholism allegedly associated with rapid development of coal fields in the west. Local officials were very wary of such growth and concerned about general deterioration in the quality of life of their communities.

This tendency for both the public in general as well as officials to view "energy development" as a uniform rather than multifaceted concept deserves some discussion. Energy development is a catch-all phrase for a number of phenomena. The umbrella nature of the term must be recognized. A strip mine, hydroelectric plant and a nuclear facility are all examples of "energy development." Yet the effects of these varied projects on both the social and physical environment are often divergent. Put another way, one should exercise caution in attempts to generalize from one type of energy project to energy development in general.

This lack of caution exists in a number of discussions of socioeconomic impacts of Nuclear Energy Centers. The NRC Nuclear Energy Center Site Survey, for example, draws implications from coal development in Sweetwater, Wyoming. Such an approach emphasizes the "boom and bust" aspect of energy development which has recently occurred in western states.

Despite the attractiveness of using research on the socioeconomic impacts of coal development in Energy Park projects, however, some wariness is in order. Coal mines are not Nuclear Energy Centers. There are a range of differences including: (a) infrastructure of surrounding area, (b) nature of labor force, (c) extent of governmental regulation, and (d) possible co-location of other industries.

EQUITY ISSUES

Public officials representing the areas identified as potential sites for an Energy Park clearly perceived the facility as a burden

rather than boon to their community. In general, they regarded the proposal as "unfair" and frequently complained that their constituents were being treated unjustly. These concerns over inequity revolved around at least five issues:

(1) Rural areas were seen as being asked to make sacrifices for urban areas. The "anti-city" undercurrent which existed in these small communities was relatively strong. Many officials from non-metropolitan areas were anxious to assure their constitutents that they were leading the fight for Rural America and would not be dominated by officials from the large cities in the Commonwealth. There was a consensus that rural communities should not be forced to become urban areas. Nor should they "sacrifice so people in Pittsburgh can have two TVs." One official said these large cities thought they could "push us around."

(2) Environmental inequities were the subject of great concern. Nuclear power, for example, was particularly singled out as a source of injustice. Officials argued that their constitutents lives "were just as valuable as people in Phoenixville near Philadelphia." The regulations requiring nuclear power plants to satisfy certain criteria in terms of distance from population centers was generally regarded as highly unfair.

Another fairness issue which consistently emerged related to the destruction of natural areas and wildlife. Officials mirrored many concerns when they argued that it is not fair to destroy the scenic beauty and physical environment of these areas merely to supply power to the cities.

(3) Social psychological inequities also were perceived. These rural communities, many officials argued, were being asked to give up their way of life. To accept a facility which would bring about major changes in the community regarding religion, family and other basic values. In the name of progress, many argued, people were asked to turn their small close-knit community into an urban area with all its tensions and crime. What was seen as an inevitable loss of "community" was regarded as highly unfair to the residents.

(4) Intra-community inequities were also regarded as problems. It was commonly pointed out that two segments of the community would not benefit by the energy facility and may even be negatively affected:

(a) Elderly residents of the area would not directly benefit because they would not be able to take advantage of new job opportunities. Rapid inflation would hurt aged persons on fixed incomes. Old people renting homes would be forced out to make room for construction workers.

In general, it was agreed that the construction of an Energy Park would be unfair to elderly people who retired in the area. Officials were quick to reassure the aged that they would do all in their power to prevent the construction of an Energy Park.

(b) Underskilled and undereducated individuals were not seen as benefitting from the facility. There was recognition that most of the highly skilled jobs would be taken by union workers or skilled immigrants. Officials recognized the probability that natives would generally obtain jobs at the lower levels of the hierarchy.

In general, there was a fear that the maldistribution of benefits from the facility would be unfair to weak competitors in the system--the aged, females and underskilled residents. The Energy Park was seen as disturbing the equilibrium of the local area. It was, most officials agreed, not worth the problems it would inevitably create.

(5) While each of the above "inequities" was recognized and discussed by public officials, none received the attention accorded perceived tax and financial inequities associated with an Energy Park. These officials were well aware of the nature of the Public Utilities Realty Tax in Pennsylvania. While this tax structure will be discussed at length in a subsequent section, let it suffice to say that in Pennsylvania utility tax revenues are redistributed by the Commonwealth primarily on the basis of the "local tax effort"--a system which heavily favors the metropolitan areas.

Given the pattern of redistribution of tax revenues from utilities, local officials immediately recognized that their communities would not benefit from the facility unless the law was changed or special compensation plans were arranged. They realized that demands for services and impact on local government would create serious problems unless major revisions in the tax structure were made. The most common statement from public officials at the local level was "And how are we going to pay for all this?".

SUMMARY

Industrialization has generally been equated with progress in American culture. Small towns in the United States have been

particularly anxious to stimulate economic growth by attracting industry and public opinion polls indicate strong grass roots support for new industry. In recent years, however, some segments of the population have been increasingly hostile to certain types of industry, e.g., energy development.

This "industry specific" public reaction was exemplified in Pennsylvania last year when intense negative reaction arose to the Energy Park proposal while a high degree of positive sentiment emerged regarding Volkswagens' decision to locate a major facility in the Laurel Highlands--a site also considered for an energy park.

Analysis of public input data revealed three major factors underlying the negative sentiment of officials to the energy park concept: (1) although no scientific surveys were taken, officials were influenced by the extreme hostility to the concept from citizens at public meetings; (2) officials had read about the "boom and bust" effects of "energy development" and were afraid of adverse community impacts; and (3) local officials were concerned over the inequities of constructing an energy park in their community--especially financial and tax inequities.

CHAPTER 1 FOOTNOTES

[1]Moore, Wilbert E., The Impact of Industry, Englewood Cliffs, New Jersey; Prentice-Hall, 1965.

[2]Smith, C. L., et al., "Economic Development," Rural Sociology, 1971, 36: 173-186.

[3]President's Commission on Rural Poverty, The People Left Behind, Washington, D.C.: U.S. Government Printing Office, 1967.

[4]Kaldor, Donald and M. Dahlke, Industrialization Efforts in Iowa's Rural Communities, Iowa State University, 1973.

[5]Hansen, Richard, "A Prescriptive Model for Industrail Development," Land Economics, 1972, 48: 76-81.

[6]Kaldor and Kahlke, op. cit., p. 6.

[7]Clemente, Frank, "Industrial Development," Pennsylvania State University, 1972.

[8]Potter, Harry, "Attitudes Toward Industry," Ohio State University, 1969.

[9]Clemente, Frank, "Attitudes Toward New Industry," Rural Development, 1976, Volume 3.

[10]Urban Life, October 1972, p. 2.

[11]A large number of projects could be mentioned here. The Kaiparowits proposal is one of the more well known examples.

CHAPTER 2

UTILITY TAX REVENUE AND DISTRIBUTION PROGRAMS: CASE STUDIES OF THREE STATES

As was pointed out in Chapter 1, one of the major "injustices" noted in the Energy Park debate related to the tax and fiscal inequities as perceived at the local level. Such a situation has clear and profound implications for the NEC concept in general. Taxation patterns and the resulting inequities will inevitably emerge as critical issues regardless of the state or region of the country in which an NEC is proposed. All available survey data on public attitudes toward energy development indicate that economic considerations are one of the major determinants of opinion (e.g., Harris poll of 1975). Utility taxation and distribution systems play a key role in shaping the economic factors which in turn influence local opinion.

Perhaps the most striking aspect of such taxation schemes in the United States is the high degree of interstate disparity. As Bjornstad noted in a recent research report for Oak Ridge National Laboratory:

> . . . 22 states tax electrical sales at the same rate as other commodities, 10 states have lower rates and 15 have higher rates. The taxation of property associated with electrical generation also differs from state to state . . . . In Pennsylvania and Wisconsin, public utilities are subject to state but not local ad valorem taxation and in Hawaii they are exempt . . . . In some states, utilities are assessed by state bodies but taxed locally, and in others they are both assessed and taxed locally.[1]

Given this significant diversity between states, it is essential that comparative assessments of several differing taxation schemes be undertaken in any evaluation of the NEC concept. Such comparisons are

necessary in order to provide benchmarks regarding the implications of different taxation schemes for public acceptance of an NEC and the mitigation of adverse effects.

Following this line of reasoning, this chapter will characterize three distinctly different approaches to utility taxation and revenue distribution as it pertains to local governments. Specifically, attention will focus on Pennsylvania, New Jersey and New York since each of these states have implemented policies which result in significant variations in the distribution to local communities.

A. Pennsylvania

1. Legislative Background

From 1825 until 1968, public utilities in Pennsylvania have been subject to special state and local tax treatment, distinct from those policies applicable to other business enterprises. Specifically, the operating real estate[2] of public utilities is generally exempt from local or state taxation. While the real estate exemption was not based on specific language in either the state constitution or statutory law, this policy evolved from numerous judicial decisions starting from 1825.

Despite the inequities inherent in these taxing policies, it was not until the late 1960's that a study was commissioned to examine utility taxation (Governor Shafer's Tax Study and Revision Commission). The constitutional convention of 1968 recommended that the real estate tax exemption be eliminated and in the same year such a measure was approved by the voters.

Article VIII, Section 4 listed below details this constitutional amendment:

Constitution of Pennsylvania

Article VIII Taxation and Finance

Public Utilities

Section 4. The real property of public utilities is subject to real estate taxes imposed by local taxing authorities. Payment to the Commonwealth of gross receipts taxes or other special taxes in replacement of gross receipts taxes by a public utility and the distribution by the Commonwealth to the local taxing authorities of the amount as herein provided shall, however, be in lieu of local taxes upon its real property which is used or useful in furnishing its public utility service. The amount raised annually by such gross receipts or other special taxes shall not be less than the gross amount of real estate taxes which the local taxing authorities could have imposed upon such real property but for the exemption herein provided. This gross amount shall be determined in the manner provided by law. An amount equivalent to such real estate taxes shall be distributed annually among all local taxing authorities in the proportion which the total tax receipts of each local taxing authority bear to the total tax receipts of all local taxing authorities, or in such other equitable proportions as may be provided by law.

Notwithstanding the provisions of this section, any law which presently subjects real property of public utilities to local real estate taxation by local taxing authorities shall remain in full force and effect.

While the first sentence of this amendment clearly eliminates the property tax exemption, the remaining paragraph predominately restores the exemption with respect to the direct taxation by local authorities. Specifically, the utility is required to pay to the state a gross receipts tax (or an equivalent special tax) in lieu of local tax obligations with the state acting as the central disbursing agency. This redistribution of revenues, which in total must not be less than the amount of taxes that local taxing authorities could have imposed, is allocated annually to local government, ". . . in the proportion which total tax receipts of each local taxing authority bear to the total tax receipts of all local

taxing authorities, or in such other equitable proportions as may be provided by law."

The implementation of this constitutional amendment through the existing gross receipts tax would have required an increase in the rate and/or scope of this tax. Moreover, the use of this tax would have caused inherent inequities since the tax would have no ad valorem relationship to utility real property. Therefore, the legislature formulated a new state-imposed and collected tax. This taxing provision was developed in the Public Utility Realty Tax Act of 1970 (PURTA) and is the focus of the next section.

2. Implementation Procedures (PURTA)

The PURTA is paid annually by all utilities regulated by the Pennsylvania Public Utilities Commission as well as electric cooperatives. This tax is imposed at the rate of 30 mills per dollar of utility real property at the original cost less accumulated depreciation and depletion (state taxable value) as indicated by the utilities accounting records. The total revenue distributed is based on the revenues local governments would have received if direct local taxation were permitted (using local tax rates and local assessing valuations). This total is referred to as the local realty tax equivalent. Allocation of funds to 3,134 eligible individual governments (i.e., county, city, borough, township or school district) is then based on the proportion of each authority's total local tax receipts to all local tax revenues in Pennsylvania. The procedures utilized for implementing this process are described below.

Each utility files an annual report (and payment) to the Department of Revenue. Included in this report is a determination of state taxable value (STV) for each utility (i) of utility land and property subject to taxation as well as calculation of utility realty tax (URT) obligations.

$$STV = \sum_{i=1}^{n} \text{(Book cost of land and property subject to taxation --Book depreciation)}$$

$$URT = STV \times .030$$

Paralleled to the actions of the utility, each local taxing authority also annually submits an application to the Department of Revenue reporting both the total real and assessed value of utility realty within the reporting division; local real estate tax rate; total tax receipts for the previous fiscal year; and a list of all utility realty within the reporting divisions. Using this information, the realty tax equivalent (RTE) for each reporting division (j)--or the amount to be distributed to local authorities--is calculated by summing the products of assessed value of utility real estate (AVURE) multiplied by the local tax rate (LTR). The following equation illustrates this relationship:

$$RTE = \sum_{j=1}^{n} (AVURE \times LTR)$$

Since any real utility property may be subject to taxes imposed by four local taxing authorities, any discrepancies in assessed values which result are resolved by employing a common assessed value usually as determined by the county.

The Department of Revenue then calculates a constant factor (CF) for each local reporting division in order to determine what proportion of RTE each authority is entitled:

$$CF_j = \frac{\text{Total Tax Receipts of Local Authority (j)}}{\text{Total Tax Receipts of All Local Authorities}}$$

The reimbursement (R) for each reporting decision is then determined as follows:

$$R_j = RTE \times CF_j$$

3. Pennsylvania Experience

The PURTA has created considerable concern in both the utilities and non-metropolitan areas with respect to equity considerations. In 1975, the total amount of revenue collected under PURTA was approximately $43,731,000. However, the funds allocated to local authorities (3,078 taxing districts participated in this allocation out of the 3,134 eligible) was less than half ($21,027,000) the total revenue collected. The president of the Pennsylvania Electric Association (a group representing the sixteen investor-owned electric companies), Earl J. Miller, has vehemently been opposed to PURTA which in effect places the utilities in a position of a tax collector for state government. While Miller is not opposed to the primary purpose of the tax (i.e., returning money to local communities based on taxable real estate), he asserts that "its like making electric customers pay double in taxes [and] we don't think that's equitable."[3]

While this realty tax is imposed at the rate of 30 mills (on book depreciated value of real estate rather than locally assessed value), the statewide average local tax rate on the market value of real estate was 30.7 mills. However, since less than half the total funds collected were dispersed to local authorities, the average effective rate across the state is approximately 15 mills. The reason for this difference is that the statewide average includes high-tax urban and suburban areas while the distribution of funds under PURTA is based on high-value property in low tax rate areas.

In effect, it is the heavily populated metropolitan areas with their extremely large tax base that benefits from PURTA at the expense of small rural communities with a relatively narrow tax base. For example, with 93 percent of the 1976 distribution of PURTA funds completed, Philadelphia (city and county) received $3,986,624, Philadelphia school district $1,633,339, and Peachbottom Township with two nuclear facilities received only $643. It is for this reason that a recent state-sponsored study concluded:

> The result is that small communities, with few tax ratables and so minimal "local tax effort"have no fiscal incentive to allow the nearby siting of PURTA-subject energy conversion facilities. The costs that the location of a public utility facility imposed on a locality are largely unreimbursed under the PURTA distribution formula. For this reason, PURTA lies at the root of much of the public resistance to local development of improved energy conversion facilities.[4]

4. Proposed Modifications to Existing Statutes

Due to the inequities fostered by PURTA and detailed in the previous section, several modifications have been proposed. This section will briefly outline the salient characteristics of each proposal.

a. Senate Bill 141 (February 1971)

This bill proposed that the 30 mill tax rate based on the utility's book value of land and property be replaced by the use of local assessments and tax rates. In addition, the bill would have modified the distribution formula to provide local taxing authorities with power plants in their jurisdiction a larger share of the revenue collected.

b. Senate Bill 142 (February 1971)

This bill was similar to SB 141 except that the distribution formula would remain unchanged to the existing law.

c. House Bill 860 (Passed August 1971 as Act 97)

This legislation excludes any municipality or municipality authority supplying public utility services from utility tax liability under PURTA.

d. House Bill 1327 (Pass November 1971 as Act 141)

This legislation extends the terms "local taxing authority" to include institution district as well as county, city, borough, town, township or school district.

e. Senate Bill 1507 (May 1976)

The bill proposes to replace the flat 30 mill tax rate with an adjustable rate which is more reflective of local realty taxation. Specifically, the tax rate would be determined by dividing the sum of the realty tax equivalents of all local taxing authorities by the total

assessed value of all public utility realty subject to the tax. If the tax collected in any year exceeds the distributed revenue by more than 5 percent, utilities will be allowed a tax credit for the following year. This 5 percent margin is intended to cover collecting and administering the program.

B. New Jersey

1. Legislative Background

Public utilities in New Jersey have been subject to a series of state and local taxes as promulgated under the laws of 1940 Chapter 5 (passed January 23, 1940) and as amended in 1961. Currently, public utilities are operating under a set of Revised Statutes (R.S.--Title 54 Chapter 30) which became effective April 1, 1975. In juxtaposition to neighboring Pennsylvania, the most distinguishing characteristic of these statutes is the ability of local authorities to directly tax and collect revenues from public utilities.

Sections 54:30A-49 to 54:30A-67 of the Revised Statutes outlines the statutory scheme for the imposition, collection, and apportionment of taxes on specific public utilities (including electric). Specifically,

> The purpose of this act is to provide a complete scheme and method for the taxation of street railway, traction, sewerage, water, gas and electric light, heat and power corporations using or occupying the public streets, highways, roads or other public places, to exempt from taxation other than imposed by this act the franchises, stock, and certain property of such corporations and for the taxation of the property of such corporation not so exempt from taxation; the reimbursement to the State of certain costs and expenses incurred in the imposition and apportionment of such taxes; the apportionment of certain of such taxes among municipalities upon the fixed standards hereinafter set forth . . .

Under the regulations detailed in these statutes, electric utilities are subject to three locally (i.e., municipality) imposed taxes. Each municipality receives revenue based on the following taxes and distribution patterns:

1. Property tax--calculated based on the land and buildings owned by the electric utility within their jurisdiction;
2. Gross receipts tax--calculated on the proportional amount of utility property located within their jurisdiction relative to the entire state; and
3. Franchise tax--calculated based on the proportional value of wires, poles, transformers, etc. within their jurisdiction relative to the entire state.

As a result of the apportionment procedures, these municipalities having large public utility installations (e.g., generating stations) within their boundaries receive the overwhelming majority of financial benefits. It should be recognized that unlike Pennsylvania's allocation scheme, this distribution pattern is not based on any other factors (e.g., population, land area, needs, etc.) besides the location of utility property.

2. Implementation Procedures

a. Property Tax

All lands and buildings owned or held by utility companies are subject to local property taxation. Specifically, the Revised Statutes assert that "all the real estate as herein defined [lands and buildings] . . . shall be assessed and taxed at local rates in the manner provided by law for the taxation of similar property owned by other corporations or individuals."[5] Each county Board of Taxation assess utility property value which in turn must be certified by the State Division of Taxation. Once this certification process is completed,

tax collectors from each taxing district receive a state authorization to forward tax bills to the utility companies. Utility companies then pay tax liabilities directly to the individual municipalities. Such property tax liability is incurred when construction begins and later adjusted for depreciation allowances.

b. Excise Taxes

In addition to local property tax liabilities, every utility is annually subject to "pay excise taxes for the privilege of exercising its franchises and using the public streets, highways, roads or other public places in this state."[6]

i. Gross Receipts Tax

The major source of utility tax revenue is derived from the gross receipts tax. Each utility company pays a tax at the rate of 7.5 percent of its total gross revenues. The State Division of Taxation has the responsibility for determining how such revenue is to be distributed among the municipalities. Specifically, the ratio of apportionment value of utility property (AV) in each municipality (j) to the total apportionment value of all utility property in the state (TAV). The apportionment of revenue each municipality receives (R_j) is calculated so that the ratio of R_j to the total revenue to be distributed (TR) is equal to the ratio AV_j/TAV. The following equation illustrates this relationship:

$$\frac{AV_j}{TAV} = \frac{R_j}{TR}$$

ii. Franchise Tax

This tax is computed at the rate of 5 percent (unless gross receipts are under $50,000 in which case the rate is reduced to 2

percent) and is calculated based on the value of wires, poles, transformers, etc. The determination of each municipality's share is identical to the process described for the gross receipts tax.

The state uniformly evaluates utility property in assessing dollar values to be used for calculating excise tax liability as detailed above. The following examples illustrate the standardized unit values assigned to utility property:

Electric Generating Stations	$ 45.00	per Kilowatt of generating capacity
Substations	$ 14.00	per Kilovolt-ampere of capacity
Switching Stations	$ 5.00	per Kilovolt-ampre of capacity
Towers	$2,530.00	per tower
Poles-- Fully Owned	$ 27.00	per pole
Poles-- Jointly Owned	$ .43	per duct foot

It should be noted that, except for the state recovering the costs of verification and auditing, all tax revenue derived from these excise taxes are apportioned to municipalities.

3. New Jersey Experience

As detailed in the previous section, New Jersey's utility tax legislation is almost directly opposite to such laws in Pennsylvania. Specifically, while there are virtually no financial incentives in Pennsylvania that encourage local communities to accept power generating facilities, New Jersey laws grant relatively large financial renumerations to encourage community acceptance of such power stations. Yet

New Jersey's regulations have also created considerable controversy with respect to equity issues. Even more interesting, however, is the fact that public opposition to New Jersey's statutes is based on similar types of equity considerations used by critics of Pennsylvania's utility tax and revenue distribution system. Specifically, while Pennsylvania's mechanism contains an inherent bias in favor of metropolitan areas in disbursing such tax revenue, there is an inherent bias in New Jersey against metropolitan regions. For example, in the 1975 gross receipts allocation, Trenton City with a population of 104,786 received $919,487 while Lower Alloways Creek Township with a population of 1,400 received $4,460,574.

In effect, New Jersey has allowed the overwhelming majority of financial benefits resulting from utility taxation to accrue to selected local governments with power facilities located within their jurisdiction. As Table 1 indicates, this has generally resulted in rural or semi-rural areas in which power generating facilities are sited receiving a disproportionate share of such revenue at the expense of metropolitan areas. A recent Wall Street Journal article clearly demonstrates the "fiscal fallout" derived from having a power facility in a community:

> . . . the only explosion that worries most folks in Lacey Township is a population explosion. In the seven years since the nuclear plant has been completed the township's population has swelled to about 12,000 from about 4,500. Most local residents think the Jersey Central facility, which could fully supply with power a city of 130,000, is the best thing that has ever happened to the community.
>
> "We ought to have four more of them." declares Ralph R. Gutbrodt, a 33 year old electrician who likes Lacey so well he spends three hours each workday driving to and from his job in Trenton, 62 miles away.

TABLE 1

ILLUSTRATIVE LIST OF PUBLIC UTILITY GROSS RECEIPTS TAXES
APPORTIONED TO MUNICIPALITIES IN 1975

MUNICIPALITY	POPULATION	APPORTIONMENT	PER CAPITA APPORTIONMENT	PER CAPITA APPORTIONMENT RANKINGS
Trenton City	104,786	$ 919,487	8.77	25
Clifton	82,437	1,206,926	14.64	20
Hamilton Township	79,609	4,729,913	59.41	17
Passaic City	55,124	269,932	4.90	38
Plainfield	46,862	337,124	7.19	31
Montclair	44,043	264,227	6.00	33
West Orange	43,715	525,664	12.02	21
Linden	41,409	7,243,445	174.92	9
Perth Amboy	38,798	214,959	5.54	35
Sayreville	32,508	3,315,454	101.99	13
New Hanover Twp.	27,410	55,273	2.02	42
Hazlet Township	22,239	146,340	6.58	32
Howell Township	21,756	890,803	40.95	18
Bridgeton City	20,435	186,751	9.14	24
Collingswood Boro	17,422	77,617	4.46	39
Madison Boro	16,710	52,583	3.15	41
Monroe Township	14,071	1,018,656	72.39	15
Ridgefield Pk. Vill.	13,990	82,931	5.93	34
W. Deptford Twp.	13,928	107,292	7.70	30
Weehawken Twp.	13,383	72,991	5.45	36 (tied)
Manville Boro	13,029	55,210	4.24	40
Burlington City	12,010	4,244,687	353.43	6
Harrison Town	11,811	2,843,558	240.76	8
Ridgefield Boro	11,308	3,696,448	326.89	7
Winslow Township	11,202	1,146,213	102.32	12
Ventnor City	10,385	87,351	8.41	28
Lower Township	10,154	85,902	8.46	27
Egg Harbor Twp.	9,882	1,153,724	116.75	11
E. Hanover Twp.	7,734	604,824	78.20	14
Newton Town	7,297	61,958	8.49	26
Upper Deerfield Twp.	6,648	459,476	69.11	16
Vernon Township	6,059	152,080	25.10	19
Branchburg Township	5,742	828,391	144.27	10
Lacey Township	4,616	2,933,255	635.45	3
Beachwood Boro	4,390	34,037	7.75	29
Holland Township	3,587	2,196,704	612.41	4
Upper Township	3,413	1,553,305	455.11	5
Delaware Twp.	3,249	34,131	10.51	22
Harmony Twp.	2,195	20,182	9.19	23
Blairstown Twp.	2,189	1,978,174	903.69	2
Elmer Boro	1,592	8,671	5.45	36 (tied)
Lower Alloways Creek Twp.	1,400	4,460,574	3,186.12	1

> Such local boosters are looking at the plant's golden eggs; they say it has lowered taxes, increased municipal services and even improved the fishing. Ironically, the often-bitter national debate over nuclear fall-out troubles few of the Lacy Township residents living practically in the shadows of a 650,000 kilowatt nuclear facility. Most of them are too busy enjoying the fiscal fallout.
>
> Since 1969, the township has received $13.2 million in taxes from the nuclear facility, and $3.2 million last year alone. Jersey Central pays all the community's operating expenses, has financed a new school and additions to another one, and has enabled Lacey to increase its police force to 21 from nine in 1971. A new municipal building was built in 1969.
>
> In addition, homeowners benefit directly. In nearby Ocean Township, the real estate tax on a $35,000 house is $1,050; in Lacey, it is only $616.[7]

While this policy has encouraged local communities to procure power stations, it has also served as a decisive factor in inter-community relations. In fact, local governments not receiving such financial renumerations are supporting a recent legal challenge to determine the constitutionality of this tax-revenue distribution mechanism. Specifically, the law suit asserts that the existing laws (as outlined in this chapter) are "unequitable, unreasonable and unjust"[8] and is seeking civil action against the governor et al. for violation of Article IV (Section VII, paragraphs 9(6) and 9(13)) and Article I (paragraph 1) of the Constitution of New Jersey as well as violation of the equal protection clause of the Fourteenth Amendment to the Constitution of the United States. This suit describes the "inequity" of the New Jersey system by pointing out that in 1975 Delaware township received $34,131 in public utility gross receipts tax. At the same time, Holland township, with

almost the same population, received more than $2,100,000. If population were the criterion, the suit argues, Delaware township's share would be $192,000 and Holland's would be $209,000. The case was presented before the Superior Court of New Jersey on July 7, 1976, and the decision only became available to us November 11. We are currently studying the implications of the decision.[9]

4. Proposed Modifications to Existing Statutes

This section briefly outlines recent proposed modifications to utility tax and revenue distribution procedures introduced in the New Jersey legislature.

a. Assembly Bill 299 (1976)

This bill attempts to completely revise the current distribution mechanisms for revenue obtained from the imposition of utility excise taxes. Specifically, the bill proposes that the portion of excise taxes levied on annual gross receipts be rebated directly to the consumer either as an annual lump sum reimbursement or as a deduction from the consumer's monthly bill.

b. Assembly Bill 1539 (February 9, 1976)

This bill attempts to alleviate the increased consumer excise tax burden which arises from increases in revenue caused by rising fuel costs and inflation rather than increases arising from increased sales. Specifically, the bill proposes to fix the base upon which the tax is computed at the total taxable revenues for 1973 plus a sum equivalent to the actual increase in sales during any year above the level for 1973 multiplied by the total taxable revenues for 1973. If total

tax liability exceeds such an amount, the revenue would be returned to tax payers in a manner approved by the Board of Public Utility Commissioners. The bill has been referred to the Committee on Taxation.

c. Senate Bill 1228 (February 23, 1976)

This bill represents the Senate version of Assembly Bill 1539. This bill, however, would modify the excise tax base from gross receipts to total taxable revenue for the year 1973 plus a minimum annual 5 percent increase plus any increases attributable to increased sales in excess of the minimum annual 5 percent increase. The bill has been referred to the Committee on Revenue, Finance and Appropriations.

C. New York

1. Legislation and Implementation Procedures

Electric utilities in the state of New York are subject to a substantially different taxing system than Pennsylvania and New Jersey utilities. First, while the New York Department of Public Service imposes a mandatory gross income tax as well as a mandatory franchise tax, neither tax is directly distributed to local communities. Second, there are a series of legislative acts which provide the opportunity for cities and villages to impose a local excise tax on the gross receipts of utilities within their jurisdiction.

The State public utility gross income tax (Section 186-a of the Tax Law) imposes a tax on such income at the rate of 3 percent annually. Prior to this tax rate effective June 1, 1971, the tax rate was 2.6 percent between March 1, 1968, and May 31, 1971, and 2 percent from July 1, 1937, until February 28, 1968. In addition to this gross income tax, each utility is subject to the New York State Francise Tax on gross earnings (Section 186 of the Tax Law) at an annual rate of 0.75 percent. This combined rate of 3.75 percent is paid out of general utility revenues since New York utilities are not permitted to pass the incidence of these taxes directly to customers as a separate item in their monthly bills. The revenue received by the state from these taxes is placed into a general state fund and are not earmarked for any specific purposes.

In addition to these state-imposed taxes, three different legislative enabling acts exist which allow local communities to place an excise tax on utilities. In New York City, the Enabling Act (Article

29 of the Tax Law: Title 00 of Chapter 46, New York City Administrative Code) permits the imposition of a 2.35 percent excise tax on a utility's gross receipts generated from the city. Prior to January 1, 1966, this tax rate was 2 percent. For all other cities in New York, an Enabling Act (Section 20-b of the General City Law) allows cities exercising their local option to tax utility gross receipts within their jurisdiction at a rate of 1 percent. Similarly, an Enabling Act (Section 6-640 of the Village Law) permits those villages exercising their local option to subject utility's gross receipts generated within their boundaries to a 1 percent excise tax.

In 1970, the Public Service Commission permitted the cost of these taxes to be computed separately in establishing rate schedules. In essence, this procedure allows rate schedules to be adjusted according to the gross receipt tax rate applicable in a specific service area. For example, while New York City residents have a total gross receipts tax of 6.10 percent implicitly computed in their rate schedule, those cities or villages not exercising their local taxing option only have a 3.75 percent tax included in rate schedules. In this manner, the Public Service Commission has attempted to provide alternative distribution techniques to local authorities.

2. Proposed Modification to Existing Statutes

If the number and substance of proposed changes to existing utility tax schemes are used as an indicator or barometer of public opinion, it appears that the concerned parties are generally satisfied with the current legislation. Specifically, while several bills have been introduced to amend Sections 186 and 186a of the Tax Law, all such proposals have been limited to changing the rate of taxation.

CHAPTER 2 FOOTNOTES

[1]D. J. Bjornstad, State and Local Fiscal Impacts Associated with Nuclear Energy Centers: Some Initial Considerations, (Oak Ridge: Oak Ridge National Laboratory, [1976]), p. 11.

[2]Operating real estate is defined as the real estate of public utilities used as useful in providing service (e.g., land, buildings, smokestacks). Examples of non-operating real estate include machinery, equipment poles and transmission towers.

[3]"Utility Executive Slams State Tax," York Dispatch, December 16, 1975, p. 9.

[4]Gary Newell, The Public Utilities Realty Tax--Its Origin, Operation, and Scope, Report prepared by the Pennsylvania Environmental Council, Inc. under contract to the Pennsylvania Science and Engineering Foundation, July 16, 1976, p. IV.

[5]New Jersey, Revised Statutes, April 1, 1975, Section 54:30A-52.4.

[6]New Jersey, Revised Statutes, op. cit., Section 54:35A-54.6.

[7]"It May Be A Hazard, But Lacey Township Loves Nuclear Plant," Wall Street Journal, 11 August 1976, p. 1.

[8]McKenney, Kurz, and Shaw vs. Governor Brenden Byrne et al., Superior Court of New Jersey, Law Division-Mercer County, December 1975.

[9]The decision of the New Jersey Suprior Court was rendered on November 4, 1976. Essentially, there were two arguments decided in this case that had direct implications for our study. First, the plaintiffs contended that the gross receipts tax was unconstitutional since the tax was derived from the sale of services by the public utilities while the revenue distribution to municipalities was not made on the basis of such sales. The decision by the court revolved around the key issue of whether the tax was a direct tax on gross receipts (i.e., an income tax) or a property tax or property tax substitute. Clearly, if the latter case is valid, the apportionment would not violate either the United States or New Jersey constitutions. After citing numerous historical judicial decisions in order to determine the intent of the Legislature, the Court found that the gross receipts tax indeed was in lieu of property taxes and hence, constitutional.

Second, and even more importantly, was the Court's decisive rejection of the plaintiff's argument that the statutes violated the equal protection

clauses of both the United States and New Jersey constitutions. Specifically, the Court argued, " . . . this allocation of funds, disproportionate though it may be, is based on a standard of evaluation that bears a direct relationship to the value of the utility property in each municipality, and the same schedule of values applies to every municipality in the state." Moreover, the statute in question " . . . sets forth a rational method of returning tax revenues to the municipalities in the same proportion that these revenues were received from the several public utilities located in these municipalities." McKenney, et al., vs. Brenden Byrne, Governor of New Jersey, et al., Opinion of the Superior Court of New Jersey Law Division--Mercer County Docket No. L-14059-75 P.W., November 4, 1976.

CHAPTER 3

TAXATION POLICIES AND PUBLIC PERCEPTION OF EQUITY

It is widely agreed that one of the major impediments to the implementation of the NEC concept relates to public acceptance of the proposal at the local level. To the extent that the populace sees an NEC as "unfair" there will be resistance and hostility to the project.

As we pointed out earlier, one of the most important determinants of public perception of equity pertains to taxation, fiscal and related economic issues. While perception of an NEC as "fair" would not be a sufficient condition to guarantee acceptance of the idea, there is strong evidence that it is a necessary condition. A number of studies have noted that residents of communities which receive large revenues from power plants are (a) pleased that their community was selected as the site and (b) often happy to support the construction of more plants.[1] In a study of two New England towns with nuclear power plants, Purdy and his associates found attitudes were affected by significant property tax advantages related to recently constructed nuclear facilities:

> . . . most residents of both communities express favorable attitudes toward nuclear plants, primarily because of the substantial increase in the tax base of their communities . . . . The most significant input into the social system in both of these communities was the money from taxes . . . residents approve of their nuclear plant neighbor because of tax benefits . . . .[2]

There is little wonder that these residents are favorably disposed to more power plants. In Rowe, Massachusetts, for example, a generating facility pays 98 percent of the community's property taxes.[3] One judge, hearing a suit brought by a neighboring community in a similar instance had a personal response to the issue: "Are there" he asked one of the litigants, "any houses for sale in that town?".

INTRODUCTION

FINDINGS AND RECOMMENDATIONS

National Academy of Public Administration
Panel on
Institutional Aspects of the Energy Centers Concept

To a real extent then, perception of whether the taxation policies relating to an NEC are fair to the local community will have substantial effect on acceptance of the project. Further, perception of an "inequitable" distribution of revenue from an NEC could also effect perception of other types of impact. As Williams and Spigel found in their study of the Oyster Creek Nuclear Station:

> . . . If residents feel that they will derive economic advantage from the plant, they tend to deny any adverse environmental effect . . . . If they feel they [will] be negatively effected, they will be much more prone to see environmental damage, even when none occurs.[4]

In terms of an NEC, therefore, perceived financial inequities are likely to "carry over" to other potential criticisms of the proposal, e.g., safety.

Such data strongly suggest that the utility taxation and revenue distribution practices of a given state would have a major effect on the local perception of inequities. In order to shed light on the various dimensions of this situation, the present chapter compares and contrasts two systems described in Chapter 2--Pennsylvania and New Jersey. To a real extent, these two states represent the extremes in terms of the taxation issue. By comparing these two divergent systems, it will be possible to ascertain the virtues as well as the vices of each system--particularly as relevant to the NEC concept.

Revenue Projections for an NEC

Before comparing the New Jersey and Pennsylvania systems, it is useful to obtain some rough estimates of the magnitude of tax revenues likely to result from the construction of an NEC. This approach will

give the reader a broad idea of the kinds of dollar figures involved and will serve as a useful backdrop to comparison of Pennsylvania and New Jersey.

Several studies have attempted to project the revenue associated with an NEC, but three of the most reasonable efforts are the following:

(1) The Battelle study of "Socio-Economic Impact of a Camp Gruber Energy Center" developed a scenario for estimating taxes for such a complex.[5] These calculations estimated that an NEC would generate $72 million in property taxes annually plus any special levies for the taxing district.

(2) The Brookhaven report of "Nuclear Energy Center in New Jersey" included a lengthy discussion of taxation and implications for an energy center in that state.[6] This group used a forty reactor NEC as a model and estimated that such a facility would result in a tax increment of over $113 million annually.

(3) The Oak Ridge study of "State and Local Fiscal Impacts Associated with Nuclear Energy Centers" also made some projections for tax revenues.[7] These calculations were made for a "generic energy center" under four different circumstances. The results indicated that the center would pay somewhere between $200 and $300 million per year in property taxes.

The differences between these various projections for an NEC, of course, are due to different sets of assumptions and calculations based on different state utility tax systems. While it is useful to obtain the broad parameters of the problem, it must be recognized that pragmatically useful calculations can only be made on a site-specific basis.

One fact, however, emerges loud and clear from these various studies. Specifically, an NEC would generate what the Brookhaven group termed a "staggering" amount of revenue. Even in states as large as Pennsylvania and New Jersey, this increment would be significant.

Pennsylvania vis-a-vis New Jersey

Pennsylvania: As was noted earlier, in this state utilities do not pay taxes directly to local communities, but rather pay such revenues to the Commonwealth. In 1975, the total amount of such revenue was about $44 million of which only $21 million was returned to 3,078 local authorities. Distribution of this $21 million went largely to the metropolitan areas with relatively small amounts going to communities where generating facilities are located.

Many examples of the kinds of inequities the Pennsylvania system generates could be given. Two will suffice to make the point:

(1) In the Pittsburgh area, two power plant sites make up almost one-half the total taxable real estate of Sprindale Borough, which received approximately $1,700 from the state distribution system in 1975. At the same time, Mt. Lebanon Township, on the other side of the city, which has no power facilities, received over $27,000.

(2) Across the state Philadelphia received over $5.6 million from the Commonwealth. The township of Peachbottom, with two nuclear plants, received $643.

These kinds of inequities have not, of course, gone unnoticed by officials of small communities where power plants are currently operating or

being proposed. Accordingly, various modifications have been proposed. In fact, there is a general recognition in many sectors of the state that the present system is not "fair" and seriously inhibits energy development:

> . . . PURTA . . . is not aimed at helping communities affected by power plant projects. We feel that utility taxes should be returned to the municipalities affected by power plant construction as costs for the various costs they must absorb . . . and provide local communities with an incentive to accept power plants (report of research team at Carnegie-Mellon University).[8]
>
> . . . small communities have no fiscal incentive to allow the nearby siting of [power plants]. (Report of Pennsylvania Science and Engineering Fouindation).[9]
>
> The Commonwealth must soon adopt some incentives for the communities burdened by power stations . . . [they] deserve compensation for the [negative effects] they endure. (Harrisburg Patriot editorial)

In each of the above passages we underscored the key word in this line of reasoning--incentive. In other words, there is general agreement that a system should be derived which motivates local communities to accept a power facility. And, of course, the underlying rationale also relates to the need to help these small communities adjust to energy development.

The problems of development without adequate tax revenues and resources have been delineated in Brenner's paper for this panel. In addition to the energy development research covered in that paper, it is possible to bring another line of research to bear on the issue. More specifically, industrial development researchers have increasingly documented the negative effect of "tax exemptions" on a community experiencing industrial growth. As was stated in Chapter 1, there is strong competition between communities to attract industry to their area with the expectation that economic progress will result for the community. In

their haste to attract new industry many communities offer tax exemptions to an incoming facility only to find themselves soon overextended in terms of providing services without adequate revenue.

This problem of small towns granting exemptions to industry parallels the Pennsylvania situation for power plants. In both cases, the host community receives relatively little revenue from the facility but must meet many new demands. In discussing this problem in a variety of communities across the country, Garrison has stated: ". . . A large negative impact results if property taxes are avoided . . . "[10] The potential inequities of the tax structure of Pennsylvania then, is not a figment of the imagination of rural government officials. Rather, it is a distinct problem which must receive thorough attention in any proposal to build an NEC, Energy Park or any type of power generating facility.

To refer back to the Energy Park debate, for example, people in the various counties, particularly public officials, were extremely concerned over possible decreases in the tax base coupled with unprecedented demands on local services. As was mentioned in Chapter 1, one of the most common questions at public meetings was "How are we going to pay for all this?". A statement of a resident in Bradford County is typical of sentiment echoed across the ten counties:

> . . . The energy park will shrink the tax base of the county and we'll be expected to provide all the services to the new people . . . At the same time all the tax money will go to the big cities and we'll get a mere pittance . . . . They are asking us to foot the bill and give Harrisburg all the taxes.

Earlier in this paper, we argued that the Energy Park debate in Pennsylvania has very important implications for the NEC concept. While other studies have delineated what the local reaction "might" be, the Pennsylvania data enables us to describe what actually did occur in one state considering aggregated siting. Further, such data enables us to draw some firm conclusions relating to the relationship between the taxation system, perception of inequities and attitudes toward complexes of power plants:

(1) The people at the local level in Pennsylvania, especially community leaders, were aware of the utility tax structure and its implications for their communities. Of the hundreds of letters and comments we have examined, none made the mistake of saying the energy park would be a tax benefit to the area.

(2) Virtually everyone who mentioned the taxation issue saw it as "unfair" to their community. There was virtually unanimous agreement that the tax and distribution systems would require major change if an energy park were to be built.

(3) As a causal variable, there can be little doubt that a significant proportion of the hostility to the energy park was based on the "inequities" associated with the utility tax system. In counties where power plants already existed, the current system was even more marked.

(4) The fiscal inequities which dominated reaction were twofold:

    (a) The local community bears the burden of development and may even suffer a decrease in tax base under the Pennsylvania system, e.g., removing existing or potential tax producing development from the local tax roll.

(b) To add insult to injury, the metropolitan areas in the state receive not only the electricity but also the bulk of the tax revenue.

In other words, to these Pennsylvania residents, the "inequity" was not merely that they would not receive compensation for accepting an energy park, but also that city dwellers would receive the money which should "rightly" go to the local community. There was a distinct anti-urban undercurrent to this reaction which could have deep implications for the NEC concept in any part of the country.

New Jersey: As was shown in Chapter 2, the utility tax situation in New Jersey is almost diametrically opposite of that in Pennsylvania. Not surprisingly, then, almost the exactly opposite kind of "inequities" have been depicted by residents of various communities in the state. Pennsylvania, of course, typically returns only a very small portion of revenue to communities hosting power plants. The New Jersey system, on the other hand, results in a bonanza for townships where plants have been sited:

> The state of New Jersey, through its local governments, exacts an enormous amount in taxes from utility companies, however, almost all of these revenues remain in the local townships. The result is the creation of wealthy townships . . . . Lower Alloways [for example] . . . had total revenues of less than $50,000 in 1970 . . . the nuclear generating now under construction [means] the township enjoys the prospect of spending 1975 revenues amounting to well over $5 million (some $3,500 for each man, woman and child) . . . The township has been building new facilities . . . spending for such buildings already approaches the saturation point.[11]

Like the Pennsylvania system, the New Jersey approach also creates some very startling discrepancies:

(1) Ridgefield Borough and Ridgeville Park Village are two adjacent municipalities in Bergen County. The former has a power facility while the latter does not. In 1975 the former received $3.7 million in revenue compared to $82,931 for the latter. This despite the fact that the village without the plant is (a) adjacent to the borough and (b) has a larger population.

(2) As was mentioned above, Lower Alloways township received nearly $4.5 million in revenue in 1975. Meanwhile, the nearby town of Elmer, with the same population receives $8,671. Put another way, the town with the plant receives 514 times as much revenue as the nearby community without the plant!

Such a policy already provokes sharp cries of "inequity" from nearby towns and large cities in the state. It is safe to say that if an NEC were built, such complaints would reach a crescendo.

In terms of public awareness of these issues two conclusions can be drawn:

(1) Residents of municipalities with power plants are very cognizant and appreciative of the tax revenue benefits they receive. Other people are trying to move to these localities to share in the benefits.

There is also a growing resentment in the "lucky" communities that other towns and cities are trying to "horn in" on a good thing. These residents feel they are only being compensated for accepting the plant and such compensation is only "fair." One resident complained:

> This township accepted the power plant in good faith . . . Many, many municipalities didn't want it. They were afraid of the risks.

(2) Residents and officials of those municipalities without power plants (the vast majority of the state) are beinning to challenge the system both in the press and in court as "unfair" and call for more equitable distribution of the revenues.

In terms of these two conflicting views we hypothesize that the latter argument will prevail for two reasons. First, the beneficiaries of the current system are in a small minority and have little political clout in the state legislature. Second, there is a certain blatancy about the service and building programs being undertaken in the townships with plants. As one critic put it, "its only a matter of time before they goldplate their school buses."

The Surrounding Area Issue.

In Pennsylvania there is increasing agreement that the host community bears the burden of a power plant while the major metropolitan areas reap the tax benefits. In New Jersey, there is increasing agreement that the host community probably received too much tax revenue from a power plant and the metropolitan areas receive too little revenue. These different patterns of revenue distribution are the subject of much debate, controversy and litigation. If an NEC were proposed in either state, the current conflict between rural areas and large cities on this issue would be greatly exacerbated.

One "inequity" which has received less attention in both states, however, is the relationship between impacts and revenue in jurisdictions surrounding the host community. In New Jersey, for example, the tax dollar may stop at the township line but the socioeconomic and institutional effects do not. And in Pennsylvania, neither the host municipality nor the surrounding area would receive revenue to offset the costs of the facility. We emphasize this neglect of the surrounding area because it is common to both states. To go back to our earlier comments on incentive, there is little reason in either state for a township to accept a proposal to site a generating plant in an adjacent township. In New Jersey, the township without the plant might receive the bulk of impacts but receive little revenue. In Pennsylvania neither the host township nor the nearby township would receive funds from the state.

Conclusion

In this chapter we chose to compare Pennsylvania with New Jersey because these states represent two completely different approaches to the taxation issue and revenue distribution. If one aspect of this comparison looms above all others, it is surely the fact that neither legislative alternative represents a desirable solution to the equity problem. On the one hand, Pennsylvania's laws (in effect) penalize host communities with power facilities by not offsetting the increased private and social costs incurred by such development. The result has been to discourage communities from not seeking such economic growth but also provides an economic incentive not to accept such development.

On the other hand, New Jersey's regulations penalize those communities not hosting power generating facilities (whether by choice or geographic and demographic restrictions) by virtually excluding these areas from participating in the enormous financial benefits associated with the construction and operation of power facilities. The result has been that communities favored by such development often are able to provide relatively more and improved public services while simultaneously reducing the local tax burden.

It should be emphasized that the implications of the distributional schemes are far from academic. Apart from the millions of tax dollars generated by an NEC, it must be remebered that energy park proposals in Pennsylvania were killed because of cries of "unfair." At the present time, many of the communities reject even traditional dispersed power plant sitings. The result has presented a very serious predicament not only for the utility companies but for the future economic viability of the Commonwealth. Minimally, the result will be increased utility bills for consumers (because of increased legal costs resulting from intervenor groups and increased lag in construction time) while an extreme perspective results in discouraging future residential, commercial and industrial development due to uncertainties in power supplies.

For New Jersey, while siting of power generating facilities has not been hindered by intra-community opposition, decisiveness between communities has emerged and threatens future development. Specifically, the impending judicial decision may have a significant impact on New Jersey's ability to satisfy future power requirements if the current distribution scheme is substantially modified.

Finally, neither system attempts to reduce the inequities suffered by nearby communities. Many scenarios could be developed indicating that a neighboring community may actually be more significantly impacted by a new generating complex than the host community. In the case of an NEC, this neglect of the surrounding area would be totally inadequate.

CHAPTER 3 FOOTNOTES

[1]Clemente, Frank, "Attitudes Toward New Industry," Rural Development (Winter), 1976.

[2]Purdy, Bruce, et al., Case Study of Community Effects of Two Operating Nuclear Power Plants, Oak Ridge National Laboratory, 1976.

[3]Hekler, K., "Evaluation of Power Facilities," Department of Housing and Urban Development, PB-239221, 1974.

[4]Williams, John and S. Spigel, "Socio-Economic Impact of the Oyster Creek Nuclear Station," Metro Study Corporation, 1974.

[5]Young, J.R. and K. E. Yandon, "Socio-Economic Impact of a Camp Gruber Energy Center," Battelle Pacific Northwest Laboratory, 1975.

[6]Brookhaven National Laboratory, "Hypothetical Energy Center in New Jersey," BNL 20594, 1975.

[7]Bjornstad, D. J., "State and Local Impacts Associated with Nuclear Energy Centers," Oak Ridge National Laboratory, ORNL/TM-5121, 1976.

[8]Carnegie-Mellon University, "Power Plant Siting Policy for Pennsylvania," Pittsburgh, 1976.

[9]Newell, Gary, The Public Utilities Realty Tax, Pennsylvania Science and Engineering Foundation, 1976.

[10]Garrison, Charles, "New Industry," National Tax Journal 44 (December) 1971.

[11]Brookhaven, op. cit.

CHAPTER 4

POLICY RECOMMENDATIONS: THE NEED FOR REALISM AND FLEXIBILITY

The underlying theme of the present paper has been the question of equity (or fairness) regarding the construction and operation of a Nuclear Energy Center. Before moving to discussion of policy alternatives or recommendations, it is useful to summarize the major conclusions which have emerged from our review of the relevant literature, our examination of the Energy Park data and our analysis of the Pennsylvania, New York and New Jersey taxation systems:

(1) While "equity" is a multidimensional concept many of the so-called "inequities" which have been popularly associated with the NEC concept are either (a) illogical or (b) questionable.

As was pointed out in our analysis of the Energy Park controversy, a wide range of perceived "inequities" were brought up in public meetings around the state. While some of these criticisms were very sound and based on solid evidence, others were of dubious validity and often were not logical given the structure of American society.

An example of an illogical argument, for instance, relates to the tendency of residents in the rural areas to criticize the plan to "build energy parks here and ship electricity to Philadelphia." Many residents said the park should be built in the large cities since "our lives are as good as their." A very real "antiurban" sentiment appeared in the rural counties.

The argument that "we are paying the price for people in Pittsburgh to have two TVs" is not logically tenable in a society as complex and

interdependent as the United States. One of the greatest hallmarks of our productive economy relates to the division of labor within and between communities. As the well known economist George Stigler has pointed out, the division of labor is a fundamental principle of modern socioeconomic organization.[1] Unless these mutual interdependencies are accepted and implemented, the entire economy would quickly collapse. Further, it must be recognized that for years large cities (e.g., Pittsburgh) have "put up" with the negative effects of making steel to supply the rest of the country. As Garvey has noted, equity will be attained for neither urban nor rural residents if a trend toward Balkanization prevails over recognition of the common interests of the national community.[2]

Just as some "inequities" are not logically relevant, so are some of very questionable empirical validity. As we pointed out in the Energy Park research, many speakers argued that the construction of an energy complex would mean a deterioration in the "quality of life" in the area. Similar assumptions that an NEC would have a negative impact on quality of life in nearby communities is implicit in much of the NEC literature. As we pointed out earlier, the NEC research is heavily dependent upon natural resource development research--coal mines and reservoirs. We have seen no convincing evidence that an NEC would negatively effect the "quality of life."

In fact, based upon our review of the industrial development and power plant literature, it is reasonable to hypothesize that an NEC may

actually increase the quality of life of a given area. The Urban Institute in Washington, D.C. has developed a "Quality of Life" scale with fourteen indicators:[3]

1. Income
2. Unemployment
3. Poverty
4. Housing
5. Education
6. Health
7. Mental Health
8. Air Pollution
9. Public Order
10. Traffic Safety
11. Racial Equality
12. Community Concern
13. Citizen Participation
14. Social Disintigration

This is a reasonable scale and if one accepts these indicators as measures of quality of life, there is little reason to project a decline due to an NEC. A number of these indicators, in fact, would clearly improve with an NEC--income, unemployment, poverty and education. A few would deteriorate--housing and some would either be unchanged or would be ambiguously effected. Few scholars who have carefully studied power plant construction and operation, however, would project a decline in more than five of these fourteen indices.

In sum, then, although many "inequities" of an NEC have been decreed in the popular press and at public meetings some of these criticisms are either potentially harmful to the "common good" or are empirically questionable. Much more work must be done before these supposed injustices should be accepted as givens.

(2) There are some problems associated with an NEC which would be generally accepted as "inequities". Even inequities upon which consensus might easily be reached, however, are not adequately treated in either the Pennsylvania or New Jersey systems (or for that matter, the tax structure of any state with which we are familiar).

There are a number of impacts related to NEC construction and operation which would generally be regarded as inequities by the bulk of the population. The line of reasoning is similar to the position taken in the NRC's Site Survey--". . . some local impacts will be perceived by most residents as positive [or] negative."[4] The clear assumption behind this argument is that there will be a general consensus among the population as to the major inequities resulting from an NEC.

Even in terms of these inequities, however, the Pennsylvania and New Jersey taxation and revenue distribution systems would fail to adequately handle most problems. Let us take, for example, the inequity referred to earlier as the "surrounding area issue." As is generally agreed, an NEC would have socioeconomic effects far beyond the host community. Many nearby communities and even other counties could be dramatically effected. Yet, in neither state would these effected areas receive tax revenues to adequately offset increased costs. A similar situation would prevail in most states across the country.

Simply put, we are aware of no state, including Pennsylvania and New Jersey, which has a taxation system which could equitably accommodate an NEC without major revision. To bring it down to blunt terms, these taxation schemes were not designed with such major facilities in

mind. In the days of Energy Parks, NEC's and guads, the taxation schemes of most states--including the two analyzed here--are archaic, antiquated and outmoded.

(3) The "state-of-the-art" relating to projecting the socio-economic effects of an NEC is extremely underdeveloped. Given this situation any effort to adopt refined revenue distribution schemes to eliminate inequities is premature.

As was pointed out earlier, an NEC is an entirely "new ball game" to most students of socioeconomic impacts. It is not being facetious to state that adequate methodologies for assessing impacts have not even been developed for single units let alone forty reactors. As Peelle and many others have noted, the state of knowledge in this area of research is very sparse and tenuous.[5]

The immaturity of the socioeconomic impact methodology associated with generating facilities is one reason why some analysts of the NEC concept have grasped onto the coal development research in the far west. The work of Gilmore,[6] for example, is frequently cited in NEC literature. Such studies of coal development, however, may have little or no relevance to the impacts of an NEC. To base programs relating to NEC impacts on the findings of the coal development research would, we believe, be extremely dangerous. Until much more research is undertaken, the appropriate perspective is to treat the power plant literature and the coal development literature as two related, but distinct, threads of research.

(4) The potential impacts of an NEC are so site "situational specific"--both site and facility--that a highly standardized approach to resolving inequities would be unworkable.

The authors of this paper were all involved in efforts to project the effects of the Energy Park proposed in Pennsylvania.[7] This research effort convinced us that so many variables are involved in such analyses that "generic" projections are, in pragmatic terms, useless. A careful review of all the relevant NEC literature in the interim has reinforced our conclusions on this issue along two dimensions:

(a) The potential social, economic institutional and environmental effects of an NEC are site specific to the extent of being almost idiosyncratic. In essence, the tremendous heterogeneity which characterizes the country precludes any precise formulae for even predicting impacts let along identifying and resolving inequities. The effect of an NEC on two hypothetical sites for example could be significantly different based merely on such variables as: (1) distance from major metropolitan area, (2) water basin, (3) demographic characteristics, (4) the transportation infrastructure, (5) proximity of other large facilities and (6) the co-location of new industries.

(b) The potential effects of an NEC are also facility specific. Even a casual review of the NEC literature, for example, indicates a great deal of disparity regarding even the definition of an NEC. The Battelle reports, Brookhaven, Pennsylvania Energy Park and the Oak Ridge work all utilize more or less different definitions of an NEC. Such discrepancies severely thwart generalizations. There would be major differences, for instance, between the effects of a ten reactor facility as opposed to a forty reactor NEC.

Similarly, the construction profile and schedule varies from study to study and would be different for each NEC. Starting units one year apart, for example, would have markedly distinct effects than starting them in two year intervals.

Our conclusion, therefore, is that there would be a "uniqueness" to each individual NEC which would prohibit the use of highly standardized formula or programs. This is not to say that there are no commonalities in the effects of NECs but rather to emphasize that the differences may well be more numerous than the similarities. The unique interaction between a given facility and a given site has a multiplicative effect which may make each "situation" an non-generalizable phenomenon.

RECOMMENDATIONS

From a theoretical perspective, the fairness or equity issue can best be identified as an interjurisdictional externality. This report has argued that the host community for an NEC experiences a complex array of benefits and costs of an environmental, socioeconomic, sociocultural, psychological and financial character. It is impossible to determine on an a priori basis whether a specific jurisdiction accepting an NEC will experience a net social benefit or cost. Nevertheless, from the perspective of a candidate community, it is usually perceived that the majority of benefits resulting from increased power capacity accrue to the broader population while all the costs are local. In effect, such candidate communities believe society is discriminating against them, and the issue of fairness has become a central point of contention with respect to facility siting.

This maldistribution of benefits and costs, whether perceived or actual, is most appropriately addressed in terms of a Pigouvian externality problem.[8] If the net social benefits of increased power supply remain positive when all costs of generation, transmission and utilization are considered, then local impacts or perceptions should not be permitted to thwart the expansion of the utility sector.

An application of the traditional Pigouvian argument would conclude that the host community should be compensated in a manner that will affect their decision making with regard to the acceptability of an NEC. In essence, if an activity has external benefits, then in order to assure the optimization of aggregate welfare, the perception or realization of local impacts must be redressed. In the context of an NEC,

this solution implies that sufficient compensation must be supplied to the host jurisdiction in order to assure the candidate sites for NEC development are available.

It is also necessary to consider the source of funds for implementing such a strategy. Ideally, an institutional mechanism for operationalizing such a program would extract the financial resources for its operation from the beneficiaries of the activity. In effect, gainers would be required to compensate losers via a transfer program.

This report has asserted that the current tax-distributional programs are inadequate for satisfying this Pigouvian standard; hence, it is necessary to consider an innovative institutional design. In the paper prepared for this panel by Dr. Mark Messing, it was asserted that the constitutional responsibility for such programs resides with state government. Alternatives for achieving the necessary financial integrity to implement such a scheme would include an ad valorem tax on utility revenues, general state tax revenues, or a broader interstate arrangement reflecting the benefits of an NEC over its effective service region.

In addition to identifying funding sources, the institutional design by which the subsidy would be awarded to host jurisdictions requires specific attention. This report has stressed the primitive state-of-the-art with respect to forecasting socioeconomic, meteorological, water basin and other impacts. When combined with locational factors and the morass of facility design alternatives, it is apparent that generic impact assessments become potentially spurious as a foundation for assistance formula specification. Hence, a Pigouvian strategy cannot be operationally based on a legislatively mandated allocation formula.

When formula distribution programs are infeasible, the traditional alternative has been increased reliance on administrative judgment. Recognizing the necessity of situational-specific considerations with regard to impact assistance programs, this recommendation relies on administrative discretion as a substitute for a priori formula distribution programs. It is noted, however, that while formula-based subsidy programs are beyond the purviews of our present state-of-the-art, sufficient information on impact forecasting is available to provide meaningful administrative guidance for such an intergovernmental grant program. That is, with our present understanding and the developing empirical evidence associated with energy facility operations, it is feasible to specify sufficient decision criteria in order to structure this administrative process.[9] Only as our state of knowledge improves over the next decade, will it be feasible to progress closer to "formula type" decision processes.

This recommendation suggests the implementation of administrative procedures for resolving the difficult and complex problem of inter-jurisdictional externalities derived from NEC's. Specifically, a state-sponsored intergovernmental assistance program based upon the Pigouvian tradition of gainers compensating losers is recommended to resolve the equity issue that is currently retarding advancement of social welfare.

CHAPTER 4 FOOTNOTES

[1]Stigler, George, "Division of Labor," Journal of Political Economy 59 (June), 1951.

[2]Garvey, G., Comments made at meeting of NAPA Energy Centers Panel, Washington, D.C., September 23-24, 1976.

[3]Jones, M. V. and M. J. Flax, "Quality of Life," The Urban Institute, Washington, D.C., 1972.

[4]Nuclear Regulatory Commission, Nuclear Energy Center Site Survey, 1975.

[5]Peelle, E., Presentation to American Nuclear Society, 1974.

[6]Gilmore, J. S. and M. Duff, Boom Town Growth Management, Westview Press, 1975.

[7]Ferrar, T. A., Energy Parks in Pennsylvania, Governor's Energy Council, 1975.

[8]The Pigouvian thesis argues that a decision making unit that fails to account for all the costs and benefits (i.e., private as well as social) associated with a given action will tend to render decisions that are suboptimal from a global perspective. In the case of energy facility siting and the positions of local communities, this argument would assert the likelihood that candidate host jurisdictions would fail to recognize the broader benefits of expanded generation capacity. Since the constituency of a candidate host jurisdiction represents only a fraction of the population that would benefit from expanded power supply, such a community will fail to account for the total benefits that would result from the project.

As a method of rectifying this socially suboptimal decision pattern, A. C. Pigou recommended a compensatory payment for the broader beneficiary population to those sustaining the more localized costs of the project activity. Provided the compensatory payment is explicitly contingent upon project size and location, then local deliberations concerning the siting decision will be appropriately influenced in a manner that reflects the broader social benefits. Hence, if a revenue transfer program to the local community were implemented so as to reflect the broader social benefits beyond the community's jurisdiction, then the community leaders would be induced to consider these extra jurisdictional effects in their decision making process. See Pigou, A. C., The Economics of Welfare, 4th ed. London: Macmillan and Co., 1962.

[9]See Robert Brenner, "Socioeconomic Impacts of Nuclear Energy Centers," pp. 2-23.

REPORT ON THE JURISDICTIONAL AUTHORITIES OF STATE AND LOCAL GOVERNMENT RELATED TO CENTRALIZED AND DECENTRALIZED ALTERNATIVE ENERGY SYSTEMS

Prepared for the National Academy of Public Administration Energy Center Panel, as part of the Environmental Policy Institute's Powerplant Siting Project.

Marc Messing, Project Director
Matthew O'Meara, Research Assistant
Richard M. Hall, Research Advisor

TABLE OF CONTENTS

Page

INTRODUCTION 159

THE NUCLEAR ENERGY CENTER SITE SURVEY (NECSS-75) 162

STATUTORY AUTHORITIES. 164

Figure 1: Principle Lines of Statutory Authority In Powerplant Siting Decisions

POWERPLANT SITING. 166

CO-ORDINATED UTILITY PLANNING. 168

Figure 2: State Site Selection and Approval Process

FEDERAL REGULATION 170

Figure 3: Federal Regulatory Authorities

DECENTRALIZED ENERGY SYSTEMS 172

Figure 4: State/Federal Authorities

EMERGING JURISDICTIONAL CONFLICTS IN POWERPLANT SITING . 175

California/San Joachin

Florida/South Dade

Mississippi Municipal Tax Authority

Montana/Water Conservancy Board

New York/ Village of Buchanan

Washington/ Northern Tier Pipeline

SUMMARY. 182

INTRODUCTION

Between 1970 and 1975 approximately 23 states enacted comprehensive powerplant siting legislation. As of 1973 these 23 states accounted for about 40% of the nation's generating capacity (see Appendix A): in 21 of these states the legislation established a single-stop siting procedure, and in 17 of these states, the legislation required long-range utility planning information (see Appendix B).

These efforts on the part of independent state legislatures during the first half of the decade signalled an unusually concerted response to a common problem; namely, that complex federal and state regulatory procedures designed to protect the multiplicity of concerns affected by the siting and operation of electric generating facilities had become a regulatory morass, and projected growth in the utility industry threatened to worsen the situation in the immediate future. At the same time, however, the assertion of state authority in the planning and siting of powerplants belies a second problem: that although the states had historically regulated the business activities of electric utility companies, none had previously assumed the authority to plan, site, and coordinate electric utility growth. While many municipalities created

municipally owned power companies to serve their needs, and some states, as well as the federal government, created limited public authorities to serve specific state and federal purposes, the general assumption was that societal needs were best served by private corporations functioning as regulated monopolies. Moreover, at the time when the industry and the regulatory framework developed, it was implicit in the operation of the electric utilities that service areas were defined on the basis of political boundaries comprising subdivisions of the state. At its inception the electric utility simply did not have the technical capability to serve larger geographic areas. As the industry matured, however, it developed not only the technological capability, but the economic incentive, to supercede local political jurisdictions. Simultaneously, national concerns for the regulation of industry, the rights of minority concerns, and protection of the natural environment, generated a federal regulatory bureaucracy which often duplicated, and occasionally preempted state authorities, and further complicated the regulatory picture. Neither the states nor the federal government had assumed, or preempted, the authority to plan, site, or operate the generation, transmission, and distribution of electrical energy supplies; but both asserted regulatory prerogatives which complicated the job.

During the ten-year period from 1965 to 1975 when both the states and the federal government addressed these problems and attempted to redefine their respective statutory authorities, they did so based on the assumption that the electric utility industry would continue to grow according to the patterns which had characterized its history. In 1974, the Atomic Energy Commission expressed these assumptions in the following manner:

1) "that total energy demand will continue to grow in relation to GNP much the same way it has in the past twenty-five years...

2) "that electrical energy input requirements...(will)continue to grow in relation to GNP in much the same way that it has in the past...

3) "that electricity (will) continue to substitute for other forms of energy in areas of current energy use and that new cases (will) be found for it in the future...

4) "electric utilities (will) continue to add more efficient generation units and, therefore, that the average energy inputs needed to produce a kilowatt hour (will) gradually decline for the total U.S. system." 1/

As we have argued elsewhere 2/, by 1975 all of these assumptions were seriously open to question, and the questions themselves were beginning to be reformulated as policy alternatives.

Firstly, notwithstanding the accumulating data regarding projected energy demands, available fuel sources, net energy calculations, reliability-size correlations, and diseconomies of scale in large new generating units, there was a growing feeling that "certain elements of the forecasting problem are beyond the state-of-the-art in forecasting..." 3/, and, that "despite the trappings of complex equations and the language of regression analysis, a relatively crude methodology underlies most electric demand forecasts." 4/

Secondly, energy forecasts were neither certain, nor unalterable, but were in fact subject to policy decisions.

Thirdly, and at the very least, a policy alternative existed regarding the decentralization of electric generating facilities and the design of energy systems to recapture the waste heat, rather than to continue centralizing and segregating electric generating facilities from points of demand. The issue, as one analyst stated it, "is not the use of electricity for lighting or for mechanical power, but for applications requiring heat." 5/ As we have also noted elsewhere, 1975 projections of increased electric energy consumption through the year 2,000

project more than a four-fold increase in per capita electric energy consumption from a 1971 base year, and anticipate waste heat losses from electric powerplants in the year 2,000 of approximately the same order as the total U.S. energy budget (including heat losses) in 1971. (See Appendix D). For these reasons the decentralization of electric generating facilities offers a bona fide policy alternative worth considering as a policy alternative; and, of course, it is consistent with the development of other decentralized energy technologies (such as solar water and space heating, heat pumps, etc.), and it is inherently compatible with the administrative jurisdictions of local units of government.

THE NUCLEAR ENERGY CENTER SITE SURVEY (NECSS-75)

The Nuclear Regulatory Commission's Nuclear Energy Center Site Survey did not recognize the problems associated with the effects of energy center development on local political authorities in its Summary and Findings: but virtually all of the workshop panels considering the problem addressed it clearly in their preparatory reports. Conducted as part of the NRC study, the Nuclear Energy Center Workshop East concluded, in part, "There was agreement that a decision to go to NEC's would tend to result in an upward shift in the locus of decision-making authority with a tendency toward greater federal involvement than is the case with dispersed siting."[67] The workshop disagreed as to the appropriate and likely extent of such federal involvement, but a sub-panel on jurisdictional interfaces concluded that "the question of the right of federal preemption is basic to the practicality of the center concept... (I)f as a matter of public policy a nuclear energy center should be established, no state should be in a position to block the implementation of that decision."[7]

Parallel workshops on the west coast arrived at similar conclusions. Noting that the role of the federal government was strongly debated and the extent of government ownership was not agreed upon, the workshop concluded, "In general, the probably increased role of the federal government in many aspects of power generation, with the attendant transfer of decisions away from more local, presumably more responsive government, was considered disadvantageous from the point of view of public perception as well as state and local government interests."[8/] The sub-panel on the socio-political impacts of NEC development observed that "The NEC being a multistate concept leads naturally to a perception of diminished state power,..(and) NEC sites might constitute among themselves a kind of network for political and economic purposes."[9/]

None of these panels attempted to identify any more precisely the specific statutory authorities of state or local government which were most likely to be affeeted, or the manner in which this transfer of authority was likely to occur. However, it should be noted that the parameters of the NECSS-75 work defined energy centers as 10,000-40,000 MWe aggregations of generating units, and stressed the evaluation of the "delta" between NEC's and a dispersed siting scenario based on 4,000 MWe "quads". Presumably the consideration of 4,000 MWe plants as the dispersed siting scenario minimized some of the effects likely to be felt at the level of local government.[10/]

STATUTORY AUTHORITIES

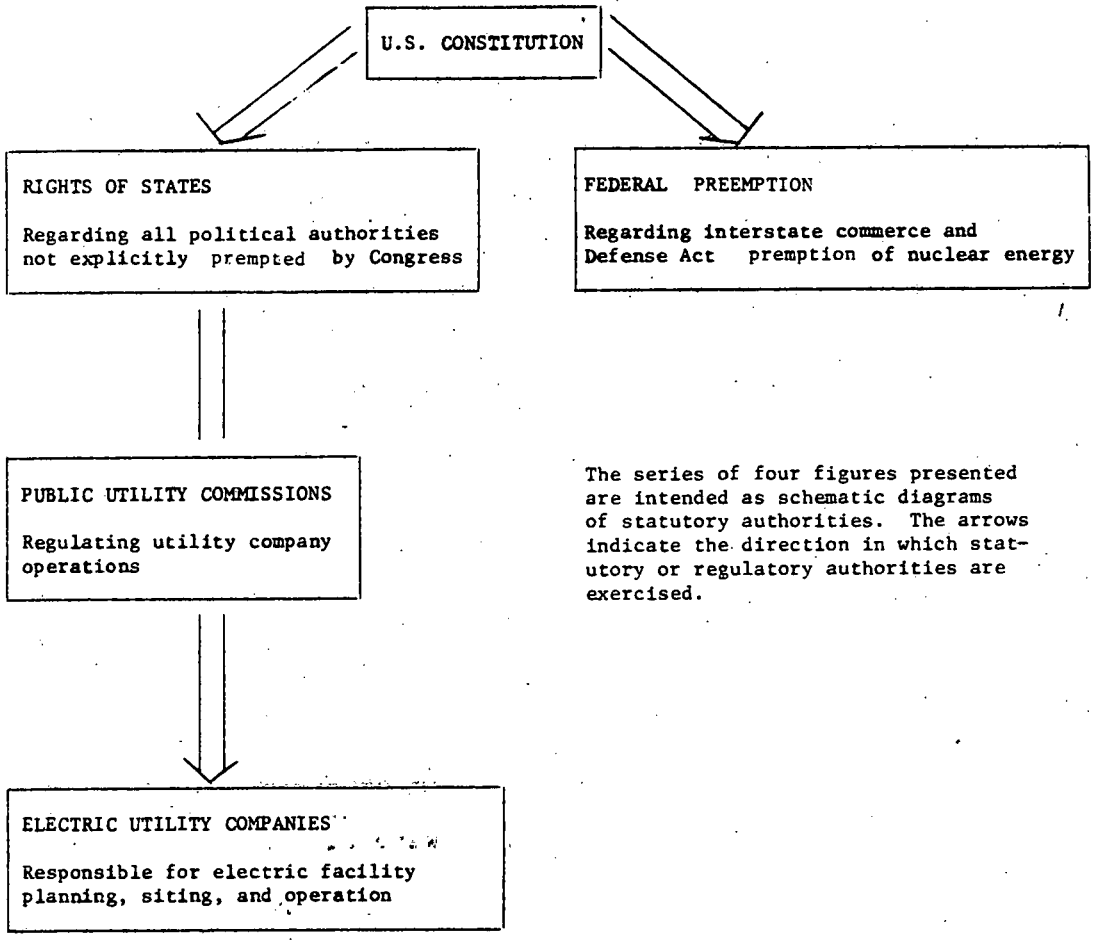
There are two principal lines of statutory authority affecting powerplant siting and both emanate from the federal Constitution; 1) insofar as the sale of electricity may cross state lines, the federal government exercises limited authorities under the Commerce clause, and 2) all political authorities not pre-empted by the Congress for federal jurisdiction reside with state government. Therefore the states assume principal authority for the siting of powerplants directly from the Constitution except to the extent that Congress has preempted specific areas of federal jurisdiction, and county, municipal, and local governments derive their authorities from the state only insofar as those authorities are delegated to them.

Historically, the states have sanctioned both the public and private ownership of electric utility companies, and have regulated the companies on the state level through Public Utility Commissions (PUC's) and Public Service Commissions (PSC's). The utility companies assumed the responsibility for planning, siting, constructing and operating the generating, transmission, and distribution facilities, and the PUC's, which were created around the turn of the century for regulating other utility industries such as gas, water, telephone, and the railroads, regulated rate-making, equipment acquisition, financing, services, and the integrity of the corporate operations. Electric utility regulation was incorporated in this framework.

Figure 1 illustrates these principal lines of statutory authority from the Constitution through state regulatory commissions.

FIGURE 1

PRINCIPAL LINES OF STATUTORY AUTHORITY IN POWERPLANT SITING DECISIONS


U.S. CONSTITUTION
RIGHTS OF STATES
Regarding all political authorities not explicitly prempted by Congress
FEDERAL PREEMPTION
Regarding interstate commerce and Defense Act premption of nuclear energy
PUBLIC UTILITY COMMISSIONS
Regulating utility company operations
ELECTRIC UTILITY COMPANIES
Responsible for electric facility planning, siting, and operation

The series of four figures presented are intended as schematic diagrams of statutory authorities. The arrows indicate the direction in which statutory or regulatory authorities are exercised.

POWERPLANT SITING

In this context the decisions to site powerplants were governed by corporate interests and obligations of the utility companies. The obligations of the companies, as defined by public service regulations, generally included the provision of reliable, low-cost, and abundant electrical energy supplies. But the corporate interests, although subject to the same PUC regulation, included additional considerations: with guaranteed rates of return provided by PUC regulation on capital construction costs, it was generally in the financial interests of the utilities to expand the system operations and increase capital construction as much as possible. Providing that the electricity could be sold, the greater capital return (based on fixed percentage of investments) permitted higher stockholder dividends, and thus supported favorable bond negotiations for long-term low-interest bond rates. As long as the systems continued to expand, these arrangements provided a sound theoretical basis for the calculation of long run average costs most favorable to the utility consumers. However, the arrangement prejudiced utility planning towards increased capacity expansion rather than the most resource efficient management options, and by the 1970's land-use constraints, resource constraints, and the increasing lead times required for new facility design and construction created internal conflicts between the corporate interests, and the public obligations of the utility industry.

Externally, the utility planning and siting functions could be divided into two general categories: 1) the planning stage, including demand forecasting, the technical evaluation of state-of-the-art designs, candidate site selection, and site acquisition, and 2) the regulatory stage, involving permit approval on the local, state, and federal levels.

The New England Regional Commission has noted some of the limitations of these planning procedures vis-a-vis utility interests:

"The trade-offs and alternatives (in siting generating facilities) were introduced mainly as a result of engineering considerations, which were easily quantifiable and expressible in monetary terms." 12/ The principal planning considerations beyond the corporate interests of the company were: 1) proximity to load, 2) relation to existing transmission facilities, 3) access to fuel transportation, 4) availability of water, 5) ease of access for construction, and 6) geological and load bearing characteristics of the site. 13/

Following the selection of candidate sites on this basis, the process of actual site acquisition was similarly affected by external considerations: "Indeed, parcels are frequently assembled by a variety of different buyers, all associated with the utility though not directly identifiable with it, in order to avoid speculative price increases. Though land price is surely a factor, when one considers the full cost of land for a site in comparison with the full cost of the facility, it becomes clear that some speculative increases in the price of the land would not be a serious economic burden. More important reasons for the maintenance of secrecy in land acquisition are:

* The possibility of a key parcel being purchased by an individual or organization intent on blocking the site...

* The desire to develop the base of information on alternate sites needed to make a systematic selection without initiating unnecessary, costly, and distracting controversy over sites which may not be selected." 14/

Regarding the regulatory aspect of the siting process, the Commission noted that in some instances as many as 46 different permits might be required from numerous federal, state, and local agencies (see Appendix C), and, over the years not only the regulatory requirements have changed, but the attitudes of the regulatory commissions as well. As public awareness and concern for electric energy supplies and environmental impacts has shifted over the years, PUC's have

tended to move from their longstanding oversight of establishing equitable rates of return on capital for new facilities and compliance with local ordinances, to review of the safety of nuclear systems, compliance with federal environmental regulations, and most recently the demonstration of proof-of-need for the new facilities.

Figure 2 briefly sketches these regulatory relations.

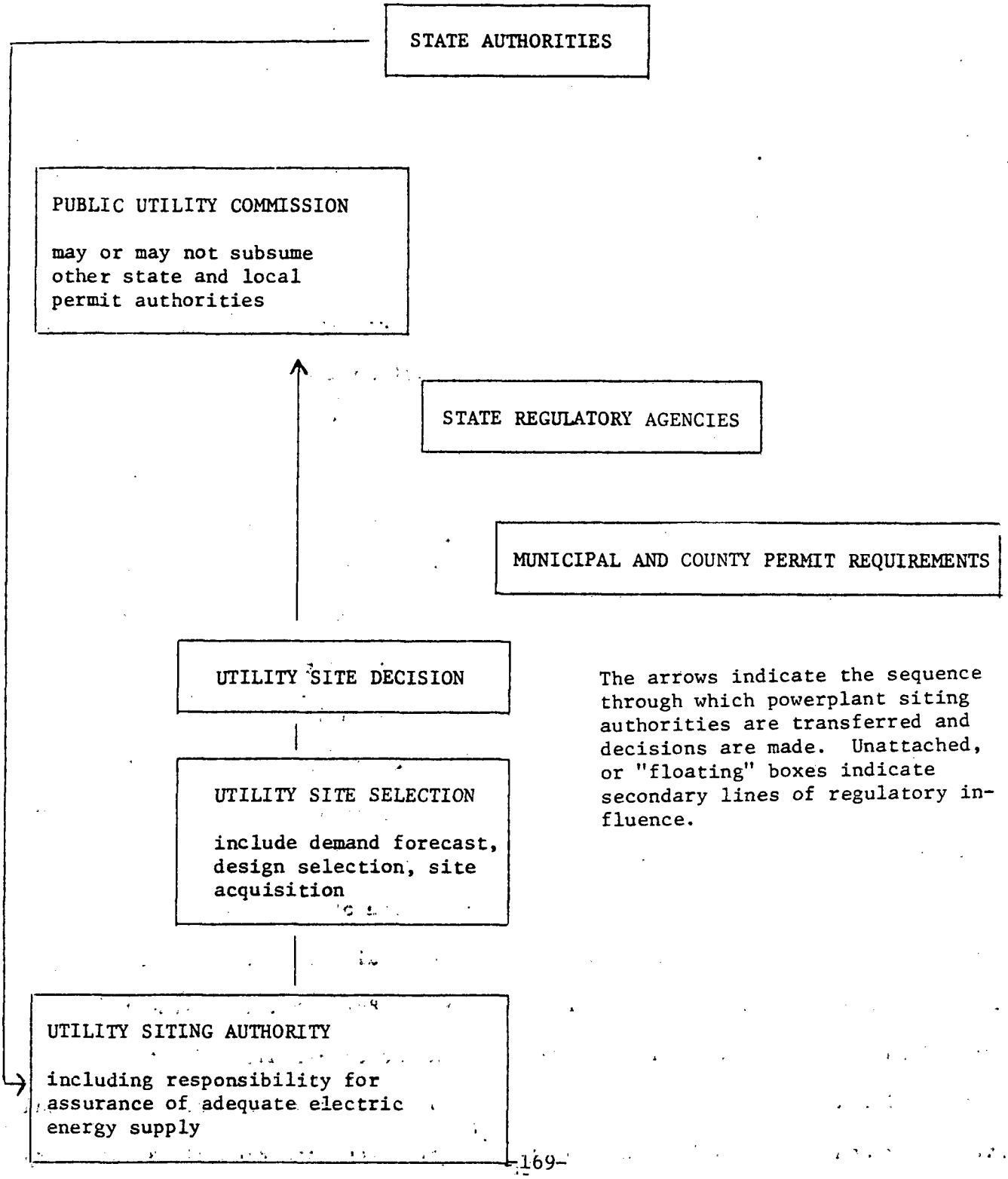
CO-ORDINATED UTILITY PLANNING

The continuous expansion of the electric utility industry into all energy markets, and coupled with the development of more sophisticated equipment, greater technical capabilities, and the integration of individual utilities into a complex network of generation, transmission, and distribution facilities across the nation, have led invariably to the extension of utility service areas beyond the jurisdictions of local, and state government. While these improvements have increased the generating capacity and capabilities of the industry, and presumably have resulted in increased reliability and decreasing costs, the evolving process has complicated utility regulation as the scope of planning has shifted from local and state to regional and federal levels. For the most part the industry has responded to the changing exigencies of its operations more rapidly than any units of government.

Subsequent to the northeast utility failure of 1965, the Federal Power Commission issued a report and recommendations regarding the need for improving the co-ordinated planning of the utility industry. But operating without the force of law [15], the recommendations resulted in the co-ordination of the utility industry planning without any corresponding co-ordination on the state or federal level. Pursuant to the FPC recommendations [16], nine regional Electric Reliability

FIGURE 2

STATE SITE SELECTION AND APPROVAL PROCESS


STATE AUTHORITIES
PUBLIC UTILITY COMMISSION
may or may not subsume other state and local permit authorities
STATE REGULATORY AGENCIES
MUNICIPAL AND COUNTY PERMIT REQUIREMENTS
UTILITY SITE DECISION
UTILITY SITE SELECTION
include demand forecast, design selection, site acquisition
UTILITY SITING AUTHORITY
including responsibility for assurance of adequate electric energy supply
The arrows indicate the sequence through which powerplant siting authorities are transferred and decisions are made. Unattached, or "floating" boxes indicate secondary lines of regulatory influence.

Councils (ERC's) were formed in conjunction with a National Electric Reliability Council (NERC) representing about 95% of the nation's load capacity. Under the aegis of the NERC, and in response to an FPC Order requesting annually updated data in twelve categories, the ERC's submit data regarding planned capacity additions unit retirements, construction programs, etc.[17/] These data are then aggregated by the FPC and made available for planning purposes; but it should be stressed that the utility associations are voluntary in nature, that compliance with the FPC is necessarily descretionary, and that no comparable government planning structure exists. In fact, in recent years the Southern Governor's Conference has created a Southern Interstate Nuclear Board for the purpose of acting as an independent regional advisory body for energy development, and the Western Governor's Conference has followed with the creation of a similar Western Interstate Nuclear Board; but the New England Regional Commission (created under Title V of the Public Works and Economic Development Act of 1965) states more directly, that "At the present time there is no regional government counterpart to NEPOOL (New England Power Pool) with authority to provide for public review of the NEPLAN forecast."[18/]

FEDERAL REGULATION

In addition to the Federal Power Commission, there are a variety of other federal agencies with regulatory authorities and planning functions affecting powerplant siting decisions. These include the Nuclear Regulatory Commission (responsible for federally preempted matters regarding nuclear energy); the Environmental Protection Agency (administration of the Clean Air Act and Federal Water Quality Control Act, as well as others); the Department of Commerce (Coastal Zone Management Act); the Army Corps of Engineers (water discharge permits and

FIGURE 3

FEDERAL REGULATORY AUTHORITIES

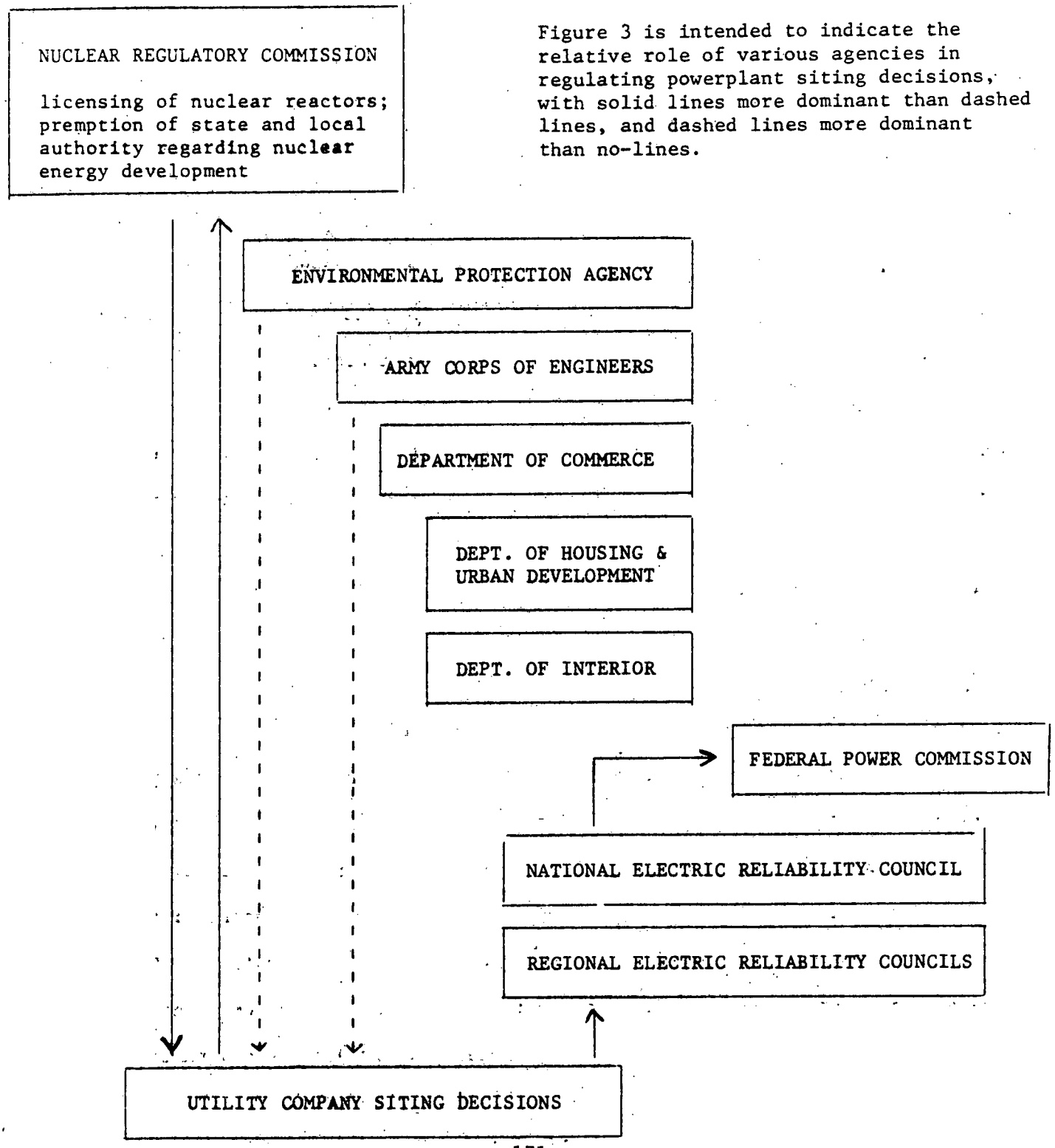

NUCLEAR REGULATORY COMMISSION
licensing of nuclear reactors; premption of state and local authority regarding nuclear energy development
ENVIRONMENTAL PROTECTION AGENCY
ARMY CORPS OF ENGINEERS
DEPARTMENT OF COMMERCE
DEPT. OF HOUSING & URBAN DEVELOPMENT
DEPT. OF INTERIOR
FEDERAL POWER COMMISSION
NATIONAL ELECTRIC RELIABILITY COUNCIL
REGIONAL ELECTRIC RELIABILITY COUNCILS
UTILITY COMPANY SITING DECISIONS

Figure 3 is intended to indicate the relative role of various agencies in regulating powerplant siting decisions, with solid lines more dominant than dashed lines, and dashed lines more dominant than no-lines.

wetlands protection); the Department of Housing and Urban Development (which furnishes federal matching funds for comprehensive plans including energy facility siting needs); the Department of Interior, and others. (See Appendix E).

Figure 3 outlines the regulatory functions of these agencies, as well as the FPC/NERC functions mentioned above.

DECENTRALIZED ENERGY SYSTEMS

For the purposes of this discussion, decentralized energy systems refer to energy systems which are located within the smallest political jurisdiction they serve. This definition is intended to include virtually all energy systems ranging from residential solar water heaters to 1250 MWe LWR's, as long as they are located within the municipality, or county of their primary service area. Nor is the definition intended to preclude inter-jurisdictional interties of electric generating facilities: but it is intended to differentiate between interconnections which are designed to provide back-up reliability, and interties which remove the electric generating facilities from their primary service areas and centralize them in sites which serve multiple jursidictions. As such the principal available technologies for decentralization include convention generating powerplants (both fossil-fueled and nuclear); small-scale powerplants (again, including both fossil-fueled and nuclear); total energy systems, heat pumps, and solar systems for space and water heating.

The potential contribution of decentralized systems to total U.S. energy supplies over the next ten to twenty-five years is impossible to quantify meaningfully. On the one hand electric generating facilities could be decentralized rather than centralized with no effect whatsoever on total energy demand or resource consumption; or, on the other hand, maximization of decentralized solar systems

FIGURE 4

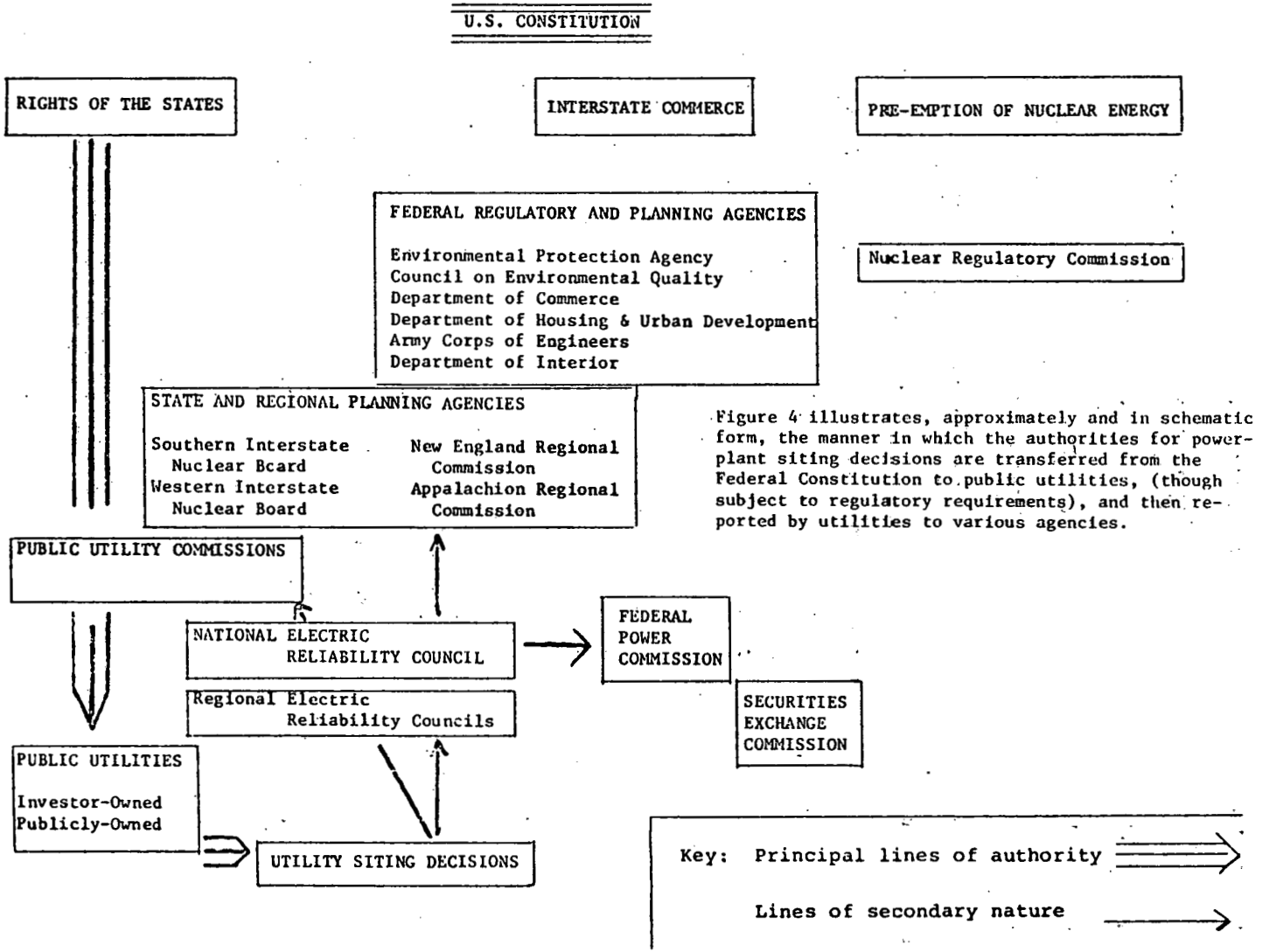


Figure 4 illustrates, approximately and in schematic form, the manner in which the authorities for power-plant siting decisions are transferred from the Federal Constitution to public utilities, (though subject to regulatory requirements), and then reported by utilities to various agencies.

(including heat pumps), total energy systems (including municipal waste recovery systems), for the purpose of energy resource conservation, could have appreciable effects within the next decade or two. The Federal Energy Administration (FEA) has estimated that solar energy could account for 5-10% of our total energy budget by 1990;[19] the Energy Research and Development Administration (ERDA) has estimated that solar will contribute something in the same range by the year 2,000[20]; the Department of Housing and Urban Development (HUD) has estimated that integrated utility systems packaging into one processing plant "all the utility services necessary for community development; electricity, space heating and air conditioning, solid waste processing, liquid waste processing, and residential water purification"[21] could recover better than half of the thermal energy wasted by powerplants, and has estimated that "an additional 5-10% fuel savings (is possible) by recycling solid waste for its energy content."[22] Perhaps the best available figures on any aspect of this subject are those developed in the Dow-Midland Energy Industrial Center Study, which concluded that the co-generation of electricity and industrial steam by industries with large demands for either of these power sources could yield an energy savings of 680,000 bbl/day (oil equivalent) by 1980, and could thus reduce the capital requirements for large central station powerplants by $2-5 billion annually without altering present rates of energy consumption.[23] The report also concluded very bluntly that this approach to decentralized siting is not only desirable, but imperative, as "It is simply a question of time before the inability of the electric utility industry to provide reliable power will become a serious industrial problem leading inevitably to declines in gross national produce and increased unemployment."[24]

Currently there are approximately 600 total energy systems in operation throughout the U.S. (primarily the result of efforts by the gas industry to develop such systems twenty years ago)[25], heat pumps are being actively marketed for the first time since the engineering refinement of the compressor/valve problems which characterized the commercial heat pumps of the 1950's[26], solar water and space heaters are similarly enjoying a renaissance, and experimental resource recovery systems are in progress in almost a dozen cities throughout the country.[27] Furthermore, many public utilities are involved in these areas, and at least one state (Florida) has enacted legislation strongly supportive of such decentralized energy concepts.[28]

EMERGING JURISDICTIONAL CONFLICTS IN POWERPLANT SITING

The development of decentralized energy systems, like the development of centralized electric energy centers, is currently constrained by institutional barriers. However, as we have defined decentralized systems, these barriers do not include the traditional jurisdictional interests of state and local governments. Rather, the barriers tend to involve the integration of these systems within the financial and regulatory framework of the predominant electrical energy networks[29], and accordingly the areas in which decentralized systems are being most actively developed tend to be municipalities with municipally owned power systems, and thus the greatest degree of jurisdictional flexibility and authority. Seattle, Washington[30]; Ames, Iowa[31]; and Dade County, Florida, which is represented by a metro-government[32], are prime examples. However, these are examples in which local political jurisdictions have exercised their authorities to pursue

alternative energy systems[33]; the following instances represent cases in which jurisdictional conflicts have arisen over the inability of local units of government to exercise similar prerogatives.

CALIFORNIA/SAN JOACHIN: The decision of Southern California Edison to withdraw from the Kaiparowits power project in Utah following political pressure and adjustment of SCE's load projections had received considerable attention as an example of one of the fundamental issues of point-to-point interstate energy centers: concern for quality of life issues may override economic and technical considerations in political decision-making. Concurrently, however, a more complex and interesting problem is developing within California.

The proposal by the Department of Water and Power of the city of Los Angeles to construct 4,800 MWe of generating capacity in the San Joachin Valley represents a potential conflict between the industrial and agricultural uses of the water and the lands of the valley which adds to a continuing conflict between local and non-local interests in the valley. The issues are political and economic as well as social, and they have long historical antecedents within the state (particularly in the history of water resource allocations). On the one side, a 160 acre limit exists on the maximum size of farms eligible for federally regulated irrigation water, together with other administrative provisions designed to protect the agricultural interests of small farmers in one of the most productive agricultural areas of the world. On the other side, these administrative regulations have been inadequately applied by federally officials to prevent the increase in average size of farms in the valley beyond the 160 acre limit. More recently, diversified multi-national corporations have moved into the valley with the

financial resources to displace small farmers (though not necessarily more efficient from an agricultural standpoint). At the same time, the state's criteria for powerplant siting have tended to limit coastal development, and force utilities to look for sites in the agricultural valleys of the state. Because of the cooling water demands of the powerplants, and the fact that most of the available water had already been pledged to competing agricultural interests, a second round of absentee-local control contests has begun.

While it has yet to be determined whether the net effect of the powerplants, if constructed, would be detrimental to the agricultural interests of the valley, it is clear that the multinational corporations may find it more profitable to produce electricity in the valley than to produce produce. A stake is not only the agricultural value of the area, but also the social, political, economic, and jurisdictional integrity of the San Joachin Valley.

FLORIDA/SOUTH DADE: In many ways, Florida's energy profile may epitomize the choices between the development of nuclear energy centers and decentralized energy systems. Historically, Florida has experienced a high rate of electric energy growth (12% annually) as the result of a continuous population influx and a heavy demand for energy intensive home appliances (e.g., air conditioners, refrigerators, freezers, etc.). In response to projected demands, Florida Power & Light (FP&L) planned the development of eight 1250 MWe nuclear reactors at its South Dade site forty miles south of Miami, and regarded the NEC as the most carefully planned in the company's history. However, the demand projections failed to recognize the apparent saturation of the heavy appliance market which began in the late 1960's, and failed to anticipate the reduction in population growth which Florida has experienced more recently, and the projected has recently been shelved (though not discarded).

Concurrently, the state of Florida has given nominal support to the development of decentralized energy alternatives through the creation of the Solar Energy Center, and the passage of a resource recovery act. Accordingly, FP&L is currently participating in projects with the municipality of Lakeland, and the metro-government of Dade County for the construction and operation of resource recovery projects in which municipal wastes are burned, and the steam is sold to the utility for the generation of electricity.

Florida is also a state with recently enacted powerplant siting legislation, including a single-stop siting provision which allows preemption of existing land use plans. Thus, while the state is actively encouraging the development of decentralized alternate energy systems which could play an integral role in land use planning and community zoning, the state has retained the authority to preempt local jurisdictions for the siting of central powerplants.

MISSISSIPPI/MUNICIPAL TAX AUTHORITY: The state of Mississippi has no recently enacted powerplant siting law, and no substantial siting controversies. Nonetheless, the existing Public Utilities Act contains a special provision regarding municipal tax rates which is worth mentioning. Under the Public Utilities Act an electric utility (if not municipally owned) must obtain from the PSC a certificate of public necessity before construction of a new facility. Most counties in Mississippi have no land use plans or zoning ordinances and facility site selection has not been a problem to date; but the Act does distinguish between its treatment of electric facilities within the corporate limits of a municipality, the PSC requires the applicant utility to first obtain a permit of "franchise" from that municipality. When the new plant begins operation, the utility is then taxed 2% of its annual

gross revenues from residential and commercial users within the municipality. If a utility which is currently operating withing the municipality is "arbitrarily refused a franchise permit", the PSC can issue its own certificate without prior municipal approval, and the city will not receive the 2% tax allowance unitl the franchise has been granted.

MONTANA/WATER CONSERVANCY BOARD: The state of Montana enacted powerplant siting legislation (subsequently renamed the Major Facilities Siting Act in 1975) and a water use act in 1973. Under the Utility Siting Act (1973), the authority for facility certification was granted to the Board of Natural Resources and Conservation, and fifty-seven review characteristics were specified along with a provision to override any local laws or regulation. The Act also made special provision for the consideration of air and water pollution control permits. Under the Water Use Act the authority for water use permits had been granted to the Department of Natural Resources. The Department received such a flood of industrial water use permit applications by energy corporations interested in the coal deposits of the Yellowstone River Basin, that the legislature imposed a three year moratorium on the issuance of such permits. The legislature further decreed that when the moratorium lapsed, priority would be given to the state and its subdivisions (including agricultural water conservation district boards) for water reservations for future use, regardless of whether previous applications had been filed by industrial or commercial interests.

NEW YORK/VILLAGE OF BUCHANAN: New York State enacted comprehensive powerplant siting legislation in 1972, authorizing a single-stop procedure under a specially created five-member board (with a floating fifth member to represent the interests of the localities immediately affected by the pro-

posed development). While none of the site applications submitted under the new law have yet come to the hearing stage, a new legal controversy has emerged involving the Village of Buchanan and the Nuclear Regulatory Commission.

In May, 1974, the Nuclear Regulatory Commission amended Con Edision's Indian Point 2 operating license to require (dependent on the outcome of further fishkill analysis) that a closed-cycle cooling system replace the present open-ended system which was withdrawing large quantities of cooling water from the Hudson River. Con Ed was directed by the NRC to seek local zoning variances so that a cooling tower, 560 feet high and 300 feet in diameter could be constructed if necessary. In June, 1975, the zoning board denied the variances, and Con Edison reluctantly appealed the decision (joined by the Hudson River Fisherman's Association) under NRC licensing requirements. The Court rules in November, 1975, that the local zoning ordinances were without force and preemption by federal regulation. The Court further ruled that Con Edison could build the cooling tower without even attempting to obtain zoning permits, and ordered that the Village of Buchanan be enjoined from attempting to enforce its zoning authority against the nuclear facility.

WASHINGTON/NORTHERN TIER PIPELINE: In 1970 the state of Washington became the first state to adopt a comprehensive one-stop energy facility siting act, under which a Thermal Powerplant Siting Council was created for the purpose of reviewing powerplant siting applications. In 1976 the function of the Council was expanded to include the review of all energy related facilities, and the Council itself was renamed the Energy Facility Evaluation Council. It is apparently considered unclear whether the original statute contained provision for the state preemption of local authority, but in 1976 the

legislature attempted to clarify the situation without successfully so doing. The amending legislation required the Council "to determine whether or not the proposed site is consistent and in compliance with county or regional land use plans or zoning ordinances. If it is determined that the proposed site does conform with existing land use plans or zoning ordinances in effect as of the date of the application, the county or regional planning authority shall not thereafter change such land use plans or zoning ordinances, so as to affect the proposed site." But the legislation did not stipulate whether the Council must accept an application at the time it is submitted and without regard to the adequacy of the application, or if the prerogatives of local governments to alter their land use plans would be affected by a decision of the Council to reject an application.

In July of this year these unresolved questions became the subject of controversy when the Northern Tier Pipeline Company sought permission to construct a supertanker port in Port Angeles, and a storage tank farm in Clallam County. Northern Tier submitted a proposal to the Council on July 6, 1976, but on July 26 the Council refused (by a vote of 8 to 5) to accept the proposal on the grounds of "gross deficiencies" in nine of the categories of information required by the Council. This was in fact the second time the Council had refused to review the application. At the time the Governor of the state happened to have been out of state, and upon his return he was apparently angered at the Council's action. Consequently a closed meeting of the Council was convened immediately upon the Governor's return, and the Council reversed its earlier decision (by a vote of 10 to 1). In the meantime, in fact, the Council had appointed a special committee to review the application, and the Commissioners of Clallam County had met and voted to amend the County's comprehensive land use plan to exclude the possibility of the Northern Tier

Project. The position of the Council, as of October 21, was that the tank farm was not in compliance with the local zoning of Clallam County as of July 6; but since then the city of Port Angeles has conducted a public referandum on the issue of the superport, and subsequently altered its zoning to exclude the port development.

The issue is currently in the midst of legal maneauvers by virtually all parties concerned, but it is clear that it has set a battleground for jurisdictional dispute between the state and its local governments.

SUMMARY:

For the better part of the past decade utility problems in scheduling, constructing, and operating large new nuclear and coal-fired generating units have focused attention on procedural difficulties, complexities, and delays in the siting and licensing process. In large part the consolidation of state regulatory and administrative processes in many states has provided some immediate improvements in the situation, and will provide more valuable insights as experience is gained with the variety of different approaches which have been created. In the meantime, improvements in forecasting techniques are likely to reduce projected electric demands for the next decade or two, and improvements in utility performances through greater equipment reliability and the increased utilization of load-management techniques, are similarly likely to reduce the need for projected capacity additions. Nonetheless, new problems are emerging regarding the centralization of authorities, and the changing role between state and federal government.

In this context, the principal findings of this paper may be instructive:

Firstly; It is important to recognize that the statuatory authority for powerplant siting can be traced to the federal Constitution, and except to the extent to which specific authorities have been reserved by the Congress for federal jurisdiction, or recently assumed by state regulatory agencies, the authority for powerplant siting is generally vested in the electric utility industry.

Secondly; The electric utility industry is generally subject to both state regulation which was developed in relation to the public needs and jurisdictional boundaries of state and local governments, and federal regulations which have frequently been inconsistent or in direct conflict with state regulatory interests.

Thirdly; Changes in the technology of electric generation, transmission, and distribution have resulted in the expansion of the electric utility industry to the point where the service areas determined by corporate interests may supercede the political jurisdictions and geographic boundaries of state and local governments.

Fourthly; Decentralized energy options provide planning alternatives to state and local governments which may affect zoning, land use planning, economic growth, and taxation, in comparison with proposed electric energy centers.

Fifthly; While decentralized energy options may involve as many institutional problems as energy centers, unlike electric energy centers in general and nuclear energy centers in particular, they are inherently compatible with the jurisdictional authorities of state and local government.

Notes:

1 Proposed Final Environmental Statement on the Liquid Metal Fast Breeder Reactor, Wash 1535, U.S. Atomic Energy Commission, Vol. 4, pp. 11.2-53,55, December, 1974

2 M. Messing, The Need for Energy Facility Sites in the United States: 1975 - 1985 and 1985 - 2000, prepared under contract with the President's Council on Environmental Quality, June, 1975, pp. 9 - 20.

3 Federal Energy Administration, Project Independence Report, November, 1974, p. 418

4 Richard J. Barber, Associates, LDC Nuclear Power Prospects, 1975-1990: Commercial, Economic & Security Implications, Prepared under contract with the U.S. Energy Research and Development Administration, p. viii.

5 Wilson Clark, Energy for Survival, Anchor Books, 1975, p. 210.

6 U.S. Nuclear Regulatory Commission, Nuclear Energy Center Site Survey (NECSS-75), V. 4, p. A-A-10

7 ibid, V. 4, p. A-A-20

8 ibid, V. 4, p. A-B-4

9 ibid, V. 4, p. A-B-12,13

10 M. Messing, letter to Wm. Anders, Chairman, U.S.N.R.C, November 25, 1975

11 D.A. Huettner, " Shifts of Long Run Average Cost Curves: Theoretical and Managerial Implications", OMEGA, The International Journal of Management Science, Vol. 1, No. 4, 1973, p. 431

12 Power Facility Siting Guidelines in New England, Energy Program Technical Report 75-8, New England Regional Commission, p. 11-5

13 ibid, p. 11-23

14 ibid, p. 111-2

15 M. O'Meara, "A Report on the Political Authorities of Electric Power Generation", working paper, September, 1976

16 Prevention of Power Failures, Vol. 1-- Report of the Commission, A Report to the President by the Federal Power Commission, July, 1967

17 FPC Order 383-3, Docket R-362.

18 Power Facility Siting Guidelines, op. cit., p. 11-22

Notes (continued):

19 "Background Paper" prepared by Division of Solar Energy, Federal Energy Administration, Office of Synfuels, Solar, and Geothermal Energy, March, 1976

20 Definition Report, ERDA-49, Division of Solar Energy, Energy Research and Development Agency, June, 1975

21 Evaluating Integrated Utility Systems, Department of Housing and Urban Development/National Academy of Sciences, 1974, p. 27

22 Ibid, p. 31

23 Energy Industrial Center Study, prepared for Office of Energy Policy R&D, National Science Foundation, by Dow Chemical Company, Environmental Research Institute of Michigan, Townsend-Greenspan and Company, and Cravath, Swaine, and Moore, June, 1975, p. 2

24 Ibid, p. 1

25 Clark, op. cit., p. 235

26 Ibid, p. 247

27 Ibid, pp. 207-251

28 Resource Recovery and Management Act, Florida Statutes, 1975, Vol. 2

29 Dow Chemical et al, op. cit. pp. 14-21

30 See Energy 1990, Seattle City Light, February, 1976

31 The Municipality of Ames, Iowa, with a municipally owned power company, opted to construct a municipal waste burning facility in response to the primary need for solid waste disposal. The solid waste stream supplies 100 tons/day with a fuel value of 5,500 Btu/lbs. There are three boilers in operation in conjunction with an 80 MWe coal burning generator. Operation began in November 1975.

32 The Dade County Metro-Government is comprised on individual municipalities within the area. Metro government collects the solid waste and sells steam to Florida Power and Light, which then generates the electricity.

33 Other municipalities with similar systems include Franklin, Ohio; New Orleans, Louisianna; Nashville, Tennessee; San Diego, California; Baltimore, Maryland (pyrolitic/low Btu gas); South Charleston, West Virginia; St. Louis, Missouri; Menlo Park, California.

APPENDIX A
STATE FACILITY SITING LAWS AND ANTICIPATED SITING PROBLEMS**

STATE	1973 Capacity* (Thousands KW)	SITING LAW Y or N		PROBLEMS[1] YN EFWC*	
Alabama	11,824		N	N	E
Alaska	586				
Arizona	4,819	Y		N	F
Arkansas	3,566	Y		N	EF
California	31,999	Y		N	E W
Colorado	3,384		N	N	E W
Connecticut	5,189	Y		N	
Delaware	1,455		N	Y	
Florida	19,073	Y		Y	C
Georgia	9,144		N	??	E WC
Hawaii	1,188				
Idaho	1,656		N	N	E
Illinois	23,989		N	N	F
Indiana	12,502		N	Y	EFW
Iowa	4,107		N	N	
Kansas	5,447		N	N	F
Kentucky	10,746	Y		N	EF
Louisiana	10,358		N		
Maine	1,707	Y		N	E
Maryland	6,731	Y		N	
Massachusetts	7,776	Y		N	E
Michigan	15,962		N	N	F C
Minnesota	5,917	Y		N	
Mississippi	3,272		N	N	
Missouri	10,461		N	N	E
Montana	1,881	Y		??	
Nebraska	3,033		N	N	E
Nevada	3,328	Y		N	EFW
New Hampshire	1,146	Y		N	
New Jersey	11,300		N		
New Mexico	3,943	Y		N	E W
New York	25,960	Y		N	E
North Carolina	11,960		N	N	E C
North Dakota	1,308	Y		Y	E W
Ohio	21,496	Y			
Oklahoma	5,795				F
Oregon	6,091	Y		N	F
Pennsylvania	23,725		N	N	E W
Rhode Island	360		N		
South Carolina	7,407	Y		??	
South Dakota	1,693		N		
Tennessee	12,826		N	N	
Texas	33,985		N	N	EFW
Utah	780		N	N	E *
Vermont	906	Y		Y	
Virginia	8,245		N	??	
Washington	15,356	Y		N	E
West Virginia	12,334		N	N	E
Wisconsin	7,664		N	N	EF
Wyoming	1,835	Y		N	

* Source: Edison Electric Institute, 1974

K E Y

E = Environmental Problems
F = Fuel Shortages - gas & oil
W = Water Availability
C = Capital Shortages
?? = Uncertain

* = Siting large concentrations of power in remote areas would involve economic and regional planning problems.

** Reprinted from The Need for Energy Facility Sites: 1975-1985 and 1985-2000

APPENDIX B:*

PROVISIONS OF STATE POWER PLANT SITING LAWS

STATE	Power Siting Law	One Stop Provision	Site Cert. Authority	Size & Comp of Site Panel*	Method of Acquisition	Applic. Fee	Annual Utility Forecast
Alabama	No						
Alaska	No						
Arizona	Yes	Yes	Arizona Power Plant Siting Committee	11 State Officials 7 Others	Cert. of Environ. Compatibil-ity	New Site $10,000 Expansion $7,500	10 Yr. Plan
Arkansas	Yes	2 Stop	Public Service Commission	Size of PSC	Eminent Domain	$500	2 Yr. Plan
California	Yes	Yes	Energy Resources Conservation & Development Commission	5 Gov. Appts.	Applic. to Site Authority	$25,000 Maximum	5-1-20 Yr. Plan
Colorado	No						
Connecticut	Yes	Yes	Power Facility Evaluation Council	9 Gov. Appts.	Eminent Domain	$25,000 Maximum	10 Yr.
Delaware	No						
Florida	Yes	Yes	Governor and Cabinet	7 Gov. Appts. Environ. Reg. Com.	Cert. of Environ. Compatibil-ity	$25,000 Maximum	10 Yr. Plan
Georgia	No						
Hawaii	No						
Idaho	No						
Illinois	No		Illinois Commerce Commission	Size of ICC			
Indiana	No						
Iowa	Yes	Yes	Iowa Commerce Commission	Size of ICC	Cert. of Conv. & Necessity	None	None
Kansas	No						
Kentucky	Yes	Yes	Public Service Commission	Size of PSC	Cert. of Environ. Compatibil-ity	None	None
Louisiana	No						
Maine	No		Public Ser. Com. &Environ. Imprv. Comm.		Certificate of Public Convenience & Necessity		

* Gov. indicates Governor of State

iy

** Southern Interstate Nuclear Board, Power Plant Siting in the United States, June, 1976

PROVISIONS OF STATE POWER PLANT SITING LAWS

STATE	Power Siting Law	One Stop Provision	Site Cert. Authority	Size & Comp. of Site Panel	Method of Acquisition	Applic. Fee	Annual Utility Forecast
Maryland	Yes	Yes	Public Service Commission	Size of PSC	Environ. Trust Fund	None	10 Yr. Plan updated Annually
Massachusetts	Yes	Yes	Energy Facilities Siting Council	4 State Officials 5 Gov. Appts.	Eminent Domain	$50,000 Maximum	10 Yr. Plan
Michigan	No						
Minnesota	Yes	Yes	Environ. Quality Council	Size of Council	Eminent Domain	$500 for each 1M of investment	15 Yr. Plan
Mississippi	No						
Missouri	No						
Montana	Yes	Yes	Bd. of Natural Resources & Conserv.	Size of Board	Applic. to Site Authority	Based on Facility Cost	10 Yr. Plan
Nebraska	No						
Nevada	Yes	Yes	Public Service Commission	Size of PSC	Permit	None	None
New Hampshire	Yes	Yes	Public Utilities Commission	Size of PUC	Eminent Domain	None	10-15 Yr. Plan
New Jersey	Coastal Facility Review Act	No	Commissioner of Environ. Protection	Coastal Area Review Board	Permit	None	None 4 Yr. State Plan
New Mexico	Yes	Yes	Public Utilities Commission	Size of PUC	Eminent Domain	None	None
New York	Yes	Yes	Bd. on Elec. Gen. Siting & the Environ.	4 State Officials 1 Gov. Appt.	Cert. of Environ. Compatibility	$25,000	10 Yr. Plan Updated Annually
North Carolina	No						
North Dakota	Yes	Yes	Public Service Commission	Size of PSC	Cert. of Compatibility	$150,000 Maximum	10 Yr. Plan
Ohio	Yes	Yes	Power Siting Commission	5 Gov. Appts.	Eminent Domain	None	10 Yr. Plan Updated Annually
Oklahoma	No						

PROVISIONS OF STATE POWER PLANT SITING LAWS

STATE	Power Siting Law	One Stop Provisions	Site Cert. Authority	Size & Comp. of Site Panel	Method of Acquisition	Applic. Fee	Annual Utility Forecast
Oregon	Yes	Yes	Governor	Energy Facility Siting Council 7 Gov. Appts.	Eminent Domain		10 Yr. Plan
Pennsylvania	No						
Rhode Island	No						
South Carolina	Yes	Yes	Public Service Commission	Size of PSC	Eminent Domain	None	10 Yr. Plan Updated Annually
South Dakota	No						
Tennessee	No						
Texas	No						
Utah	No						
Vermont	Yes	Yes	Public Service Board	Size of PSB	Cert. of Public Good	None	None
Virginia	No						
Washington	Yes	Yes	Governor	13 State Officials 1 Gov. Appt.	Eminent Domain	$25,000	
West Virginia	No						
Wisconsin	Yes	Two Stop	Public Service Commission	Size of PSC	Cert. of Approval		10 Yr. Plan Updated Biennially
Wyoming	Yes	Yes	Industrial Siting Council	7 Gov. Appts.	Permit	$100,000 Maximum	5 Yr. Plan Updated Annually
Puerto Rico	No						

Federal legislation in this area is expected, but as yet has not been enacted. Many approaches to the problem have been studied and one of the most viable would grant the responsibility for siting to the states, including their cooperation on a regional basis. This would ensure the maintenance of state policies for directing the state energy facility siting process, while including an interstate cooperative mechanism to provide proper perspective for state and regional effects.

APPENDIX C: *

Table II-4
Permits Required for Construction and Initial Operation of Boston Edison's Pilgrim Station-Unit #1*

I. TOWN OF PLYMOUTH

. Board of Appeals

- A special permit to authorize use of the plant site.

. Commission of Public Safety

- Permits to Build Structures
- Permits for Alterations and Repairs (to existing structures at site)
- Electrical Wiring Permits
- Plumbing Permit
- Elevator Inspection Certificates

. Board of Health

- Disposal Works Construction Permits

. Fire Department

- Fuel Oil Storage Permit

. Town - General

- Construct and Repair Sewage Disposal System
- Permission to work overtime at site
- Transmission line tree trimming
- Permission to cross public ways with overhead wires

II. COMMONWEALTH OF MASSACHUSETTS

. Massachusetts Department of Public Works

- Access Road Connection to Route 3A
- Placement of Oceanographic Instruments

*Application for a construction permit for Pilgrim #1 was filed in June 1967, and the plant became operational in July 1972.

* Reprinted from New England Regional Commission Power Facility Siting Guidelines

Table II-4
Continued

- Waterfront Construction and Dredging
- Transmission Crossings
- Tree Trimming

. Massachusetts Department of Public Utilities

- Transmission-Certificate of Convenience & Necessity
- Transmission-Right of Eminent Domain
- Transmission-Exemption From Zoning

. Massachusetts Department of Public Health, State Examiners of Plumbers

- Sanitary permits for station and recreational areas

. Massachusetts Department of Public Health, Board of Environmental Health

- Permit to operate heating boiler
- Permit to operate temporary startup boiler
- Approval of station operating procedures
- Approval of all inter-connections between city water line and plant water systems (i.e., fire protection, make-up demineralizer)

. Massachusetts Department of Public Safety, Division of Fire Prevention

- Fuel storage permits
- Use of explosives

. Massachusetts Department of Public Safety, Board of Boiler Rules

- Heating boiler operating permits
- Pressure vessel inspection certificates

Table II-4
Continued

- Massachusetts Water Resources Commission
  - Salt Water Use Permit
  - Permit to Conduct Marine Hydrology Studies
  - Water Quality Certificate
- Massachusetts Department of Natural Resources
  - Breakwater Construction and Dredging Permit
  - Transmission Line Easement in State Forest
- Massachusetts State Board of Labor & Industries
  - Boston Edison has registered with the Mass. Board of Labor and Industries for storage of radioactive sources.

III. U.S. GOVERNMENT

- United States Atomic Energy Commission (now NRC)
  - Exemption to Place Concrete Before Receipt of an Official Construction Permit
  - Pilgrim Station Construction Permit*
  - Nuclear Fuel Storage
  - Nuclear Source Storage
  - Licensing of Station Operators
  - Pilgrim Station Operating Permit

United States Army Corps of Engineers

- Placement of Oceanographic Instruments
- Waterfront Construction, Dredging and Spoil Disposal
- Water Refuse (Environmental Protection Agency)

Federal Aviation Administration

- Meteorology Tower Construction and Lighting
- Main Off-Gas Stack Construction and Lighting

*The AEC (now NRC) Construction Permit process, including preparation of the Preliminary Safety Analysis Report (PSAR) is by far the most involved element of the site approval process.

APPENDIX D:

ELECTRIC ENERGY GROWTH PROJECTIONS

Recent estimates of energy development have projected that the Nation's total energy growth is likely to increase at an annual rate of 2-3%, while electric energy growth is projected to increase 5-7% annually. The following tables indicate the range of recent energy projections and the general relation between increases in total energy consumption and per capita energy consumption.

Table 1 indicates the rates of growth and factors of increase contained in the Atomic Energy Commission Environmental Impact Statement on the Liquid Metal Fast Breeder Reactor-- one of the last and most comprehensive documents published by the AEC (Dec. '74). The figures represent base case projections and are essentially compatible with most other government and industry forecasts. Table 2 illustrates the contribution of electric energy to the total U.S. energy budget, and the heat losses associated with electric conversion (at the rate of 3,412 BTU/kWhr).

By examining the data in the first table, it is apparent that while total energy consumption is projected to increase approximately three-fold (2.93) by the year 2,000, per capita electric energy consumption is projected to increase more than fourfold (4.12); and total electric energy consumption is expected to increase almost sixfold (5.63). At the same time it is apparent from table 2, that the increased electric energy consumption will result in energy losses (in the year 2000) approximately equal to the Nation's total energy consumption in 1971 (68.969 QBTU).

In general these forecasts have been based on the observed correlation between increased in GNP and BTU consumption, extrapolating from past trends with variables introduced for price fluctuations, demand elasticities, and the introduction of anticipated new technologies. Implicitly these studies have similarly assumed continued substitution of electric for non-electric energy forms (without specific market analysis or examination of potential non-electric substitutions), and they have assumed a causal relation between energy consumption and economic growth (despite the historic displacement of labor with the introduction of energy intensive technologies).

The tables are drawn from The Need for Energy Facility Sites in the United States: 1975-1985 and 1985-2000, a report prepared by the Environmental Policy Institute under contract with the Council on Environmental Quality.

RATES OF GROWTH AND FACTORS OF INCREASE FOR PROJECTED U.S. ENERGY CONSUMPTION: 1971-2000

	1971 (actual)	2000 (projected)	Annual Rate of Growth (%)	Factor of Increase
Population (millions)	207[a]	279[a]	0.9	1.35
Per Capita Energy Consumption (MBTU)	333[b]	726[b]	2.7	2.18
Total Energy Consumption (QBTU)	68.969[c]	202.637[c]	3.8	2.93
Installed Per Capita Generating Capacity (kW)	1.78[a]	6.72[a]	4.7	3.78
Per Capita Electric Energy Consumption (kWhr) *	7,800[a]	32,210[a]	5.0	4.12
Total Electric Generating Capacity (millions of kW)	367.5[a]	1,880.0[a]	5.8	5.12
Total Electric Energy Production (TkWhr)	1.60[a]	9.01[a]	6.1	5.63

M. Messing/EPI

a Energy Research and Development Administration Wash 1535, Dec., 1974, Table 2.1-13
b Computed from "a" above
c Op. cit., Table 2.1-12
* Per capita energy consumption computed on the basis of total energy divided by population

note: columns three and four have been computed from columns one and two

COMPARISON OF ELECTRIC ENERGY PRODUCTION AND TOTAL U.S. ENERGY PRODUCTION: 1971 - 2000

	1971	percent of Total	2000	percent of Total
Total Energy Budget[a]	68.969	100	202.637	100
Electric Energy Resource Consumption[a] (resource input in QBTU)	17.048	25	100.287	49
Electric Energy Production[b] (resource output in QBTU)	5.868	8.5	38.019	18.7
Energy Lost in Electric Generation[c] (computed on the basis of 3,412 BTU per kWhr, presented in QBTU)	11.180	16.5	62.268	37.5

M. Messing/EPI

a Energy Research and Development Administration Wash 1535, Dec., 1974, Table 2.1-12
b Computed from "a" above
c Computed from data above

note: percent figures represent percent of Total Energy

FEDERAL-STATE CONFLICTS AND COOPERATION IN THE SITING OF NUCLEAR ENERGY FACILITIES

ORVAL HANSEN

Introduction

Decisions and actions relating to the siting, construction and operation of nuclear energy facilities come within the jurisdiction of the federal government and the states. Problems of overlapping and conflicting jurisdiction are essentially the same whether those facilities are to be located at dispersed sites or in large centers. An examination of the applicable statutes and regulations, including proposed legislation, at both the federal and state level that affect the siting of nuclear power plants, therefore, should provide useful insight into the problems that would be encountered in the siting of multiple units, including power plants and fuel cycle facilities at nuclear energy centers. To better understand the nature of potential federal-state conflicts and the steps that might be taken to reduce or eliminate those conflicts it is the purpose of this paper to examine the areas of federal and state jurisdiction, particularly in the light of current trends within the states, as they relate to siting of nuclear power plants and to suggest a course of action that would lead to a cooperative arrangement between the federal government and the states in making and implementing timely decisions relating to the siting of nuclear power plants.

I. CONSTITUTIONAL AND STATUTORY FOUNDATIONS OF FEDERAL AND STATE AUTHORITY

A. Post-World War II Federal Monopoly

With the emergence of nuclear energy during World War II exclusively for weapons' purposes the authority of the federal government over all nuclear energy activities was total and unquestioned. Federal authority was rooted in the provisions of the Constitution granting the federal government the power to provide for the common defense, to regulate interstate and foreign commerce and to control United States property.[1]

The federal monopoly over nuclear energy was confirmed and continued with the passage of the Atomic Energy Act of 1946[2] which transferred responsibility from military authorities to a five-member civilian Atomic Energy Commission (AEC). The Act did not contemplate or provide for any state regulation of nuclear energy. The role of private industry was limited to contractual operations with the federal government.

B. Atomic Energy Act of 1954

Passage of the Atomic Energy Act of 1954[3] ended the federal monopoly over nuclear energy and provided for private industry participation in the development of the peaceful uses of nuclear energy. The Act established a program of federal licensing and regulation of a wide range of activities including the possession and use of nuclear materials and the construction and operation of nuclear power reactors, production and other facilities. Licenses could be issued only on the condition that adequate provisions were made for the protection of the health and safety of the public.

A major purpose of the 1954 Act was the encouragement of private industry participation in the development of nuclear power for the generation of electricity. No provision was made, however, for a state role in the regulation of any nuclear facilities or activities. The lack of interest on the part of the states in regulating nuclear energy was reflected by Congress in writing the 1954 Act.

C. Enactment of Section 274 in 1959

State interest in nuclear energy did develop in the years following passage of the 1954 Act. Several states created study or advisory commissions on nuclear energy and took steps to regulate or register radiation sources.

With the enactment of Section 274 of the Atomic Energy Act[4] in 1959 provision was made for state participation in the regulation of certain nuclear energy activities subject to specific conditions and limitations. To qualify a state must establish a program for the control of radiation hazards that is adequate to protect the health and safety of the public. State standards must be coordinated and compatible with AEC standards. The Commission retained authority to issue rules and regulations and to terminate or suspend an agreement with a state if such actions were deemed necessary to protect public health and safety.

State authority was largely limited to by-product materials, source materials and special nuclear materials in amounts not sufficient to form a critical mass. The Commission retained

authority over a number of specific activities including construction and operation of certain production and utilization facilities.

It is clear from the legislative history of the 1954 Act and Section 274 that Congress intended to pre-empt for the federal government broad authority to regulate nuclear energy activities under its constitutional power to regulate interstate commerce. Authority granted to a state was narrow and limited by its agreement with the Commission.

The authority of the states to regulate Commission-licensed activities for certain purposes was recognized in Section 274 which provided that

> Nothing in this section shall be construed to affect the authority of any state or local agency to regulate activities for purposes other than protection against radiation hazards.[5]

It remained for court decisions to determine more precisely the extent of federal pre-emption and of state authority.

D. Court Interpretations of the Atomic Energy Act

Section 271[6] was included in the 1954 Act to preserve the public utility jurisdiction of the states to regulate rates and services of electric power produced by AEC-licensed facilities. This provision was given a much broader interpretation by the Ninth Circuit Court of Appeals than Congress intended, however. In Mann v. United States[7] in 1965 the Court upheld the authority of the Town of Woodside and the County of San Mateo to prohibit the construction of overhead transmission lines of the capability required to serve the Stanford Linear Accelerator being built by

the AEC on property owned by Stanford University. Congress lost little time in passing legislation to reverse the effect of the decision, declaring again its intent to limit the states and local subdivisions to the regulation of rates and services of electric power produced at nuclear facilities.[8]

Congressional intent to pre-empt the regulation of radiation hazards for the federal government was upheld in Northern States Power Company v. Minnesota.[9] The State of Minnesota attempted to impose more restrictive limits on radioactive effluent of a nuclear power plant than those required by the AEC. The Supreme Court held that the federal government had pre-empted this area of regulation. It should be noted that this decision led to efforts in Congress, unsuccessful to date, to amend the Atomic Energy Act to give states the power to impose greater restrictions on the radioactive discharge from nuclear power plants than are required by AEC regulations.

E. Energy Reorganization Act of 1974

Congressional intent to maintain federal authority over nuclear energy facilities and activities was reaffirmed in the passage of the Energy Reorganization Act of 1974[10] which abolished the AEC and created the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC). The licensing and regulatory authority of the AEC was assigned to the NRC and was expanded and made more explicit. The NRC retained the almost exclusive authority of the AEC to regulate production

and utilization facilities, particularly including nuclear reactors. Its exclusive authority to regulate the discharge of all radioactive materials into navigable waters has recently been upheld by the Supreme Court.[11]

Other legislation in recent years has assigned to other federal agencies the responsibility for the regulation of some activities that are incident to the operation of nuclear power plants. The National Environmental Policy Act[12] (NEPA) requires the Environmental Protection Agency (EPA) to establish standards for the protection of the general environment from radioactive materials and to regulate the disposal of wastes into the ocean. The Federal Water Pollution Control Act Amendments of 1972[13] (FWPCA) added authority in the EPA to regulate the discharge of certain pollutants such as thermal pollution, but not including radioactive effluents, from nuclear plants into navigable waters.

The Federal Energy Administration (FEA) was established in 1974[14] to address a wide range of energy related problems. While the FEA does not exercise regulatory authority over nuclear power plants it does have a major role in forecasting and planning for national energy needs. It has been assigned a lead role in determining means to expedite the siting of energy facilities including nuclear power plants.

II. EMERGING STATE INITIATIVES

A. Growing State Challenge to Federal Authority

During most of the three decades since passage of the Atomic Energy Act of 1946 the exercise of broad federal authority over nuclear energy was largely unchallenged by the states. State acquiescence in a dominant federal role may undoubtedly be attributed to the initial emphasis on the military applications of nuclear energy, to the fact that many of the activities were classified and out of sight of the public and to the fact that almost all the scientists, technicians, engineers and others with knowledge and expertise in the nuclear energy field were employed by the federal government and its contractors.

Perhaps the most obvious explanation for lack of early state interest in regulating nuclear power plants was the lack of plants to regulate. The first commercial plant began operations at Shippingport, Pennsylvania in 1957. By the end of the decade of the 1960s only another dozen plants were operating. All were producing less than one percent of the nation's electric power.

During recent years public awareness of nuclear energy and state interest in regulating nuclear power plants have grown at an accelerating pace. This interest has undoubtedly been enhanced by heightened environmental concerns, by controversy surrounding the safety of nuclear energy facilities and activities and by growing public discussion of energy issues.

Initiatives within the states affecting nuclear power plants have taken a variety of forms. For purposes of this analysis they will be grouped under two broad categories: 1) those

directed primarily at nuclear power plants including radiological health and safety aspects that seem to fall clearly within the exclusive jurisdiction of the NRC; and 2) those dealing with power plants and energy facilities generally which include nuclear power plants. Some are in the form of bills for passage by state legislatures and some are in the form of propositions to be voted on by the people as a result of petitions. Nuclear power plants are the main target of the latter.

B. Nuclear Moratorium Legislation

Legislation which has been enacted or proposed in a number of states would extend regulatory authority over nuclear power plants in direct conflict with federal authority, primarily that exercised by the NRC. For purposes of this analysis the legislation may be grouped in categories as follows:

(1) Comprehensive State Regulation: A 1975 Oregon statute[15] provides probably the broadest authority asserted by any state to regulate nuclear power reactors. It created the Energy Facility and Siting Council (EFSC) with authority to determine the conditions of an energy facility. The applicant must agree, as a condition of the issuance of the certificate, to abide by all the conditions of the certificate and all the rules of the EFSC relating to the protection of public health and safety. The EFSC is empowered to establish safety standards including emission levels and waste storage, transportation and disposal. Radiological health and safety aspects of a nuclear reactor clearly fall within the scope of the regulatory authority granted to the EFSC which has specific power to regulate transportation of

radioactive materials to or from the plant, to review and approve security programs for nuclear power plants and to establish evacuation plans. Plant operations may be curtailed or halted if there is determined to be a danger of violation of safety standards.

(2) Construction Prohibition and Derating: Perhaps the best known example of this type of initiative is Proposition 15, the so-called Nuclear Safeguards Initiative which was defeated in the California Primary Election in June 1976. It provided that after one year no additional nuclear power plants could be built in the state unless all limits on liability were removed or waived assuring full compensation in the event of an accident. After three years no plants could be constructed unless to the satisfaction of the state legislature, as evidenced by a two-thirds vote of each house, safety systems had been tested and adequate provisions had been made for the storage of radioactive waste. In addition, if these conditions were not met within a specified time all existing nuclear power plants in the state would be progressively derated ultimately to zero.

Although California voters rejected Proposition 15, bills with similar provisions were introduced last year in the state legislatures of Massachusetts, Missouri and Oregon. Some of these provisions were also retained in three bills enacted into law in California just before the June Primary Election. These bills require that before new plants can be constructed (a) methods for reprocessing and recycling nuclear fuel must be available, (b) methods for long-term storage or disposal of radioactive wastes

must be available, and (c) a study must be made on the feasibility of building nuclear reactors underground. Passage of these bills offered an alternative to Proposition 15 which undoubtedly contributed to its defeat.

(3) Construction Prohibition Unless Specific Conditions Met: Legislation introduced in Maine and Vermont and ballot initiatives in a number of states incorporate variations of the provisions of California's Proposition 15, i.e., nuclear power plants would only be built if there was a removal or waiver of liability limits, demonstration of effective safety systems and adequate storage or disposal of radioactive wastes. These proposals would not affect existing plants but would bar construction of new plants unless the conditions were met.

Propositions were on the ballot in the November 1976 General Election in a total of six states. Washington, Oregon, Montana, Arizona, Colorado and Ohio. All were rejected by the voters by wide margins. There is little agreement on the interpretation of results of the vote. Proponents argue that the greater amount of money spent to defeat the propositions made the difference. Opponents concede the disparity in spending but contend that it was necessary to overcome the effect of media treatment of news about nuclear energy which is often adverse to the interests of nuclear power. The decisive vote in seven states, however, undoubtedly permits at least the tentative conclusion that ability of proponents of nuclear power to mobilize greater resources to fight anti-nuclear ballot propositions was a major factor in the decision of the voter and will likely continue to be a major

factor in defeating any future similar propositions. These results should not be interpreted as a green light for nuclear power, however. There is ample evidence of public concern about the safety of nuclear plants and radioactive waste. Nuclear opponents show no sign of giving up because of their lack of success in these state votes. The principal effect may be a shift in tactics which might well include a greater effort to persuade state legislatures to pass restrictive legislation.

An Iowa bill is an example of this approach. It would prohibit the building of new plants until a commercial facility for the reprocessing of spent nuclear fuel had been in continuous operation for one year and the public utility proposing to build the plant had made permanent arrangements for the reprocessing of its spent fuel at this facility.

(4) Construction Prohibition To End When Conditions Met: Legislation has been introduced in four states, Minnesota, Washington, Michigan and Delaware, which would prohibit construction of any new nuclear power plants for a specified period of years. At the end of the period plants could be constructed only if specific conditions have been met. These include certain plant safety standards, effective safety systems, adequate systems for the storage of radioactive wastes and the safeguarding of radioactive materials during transportation. In addition, there must be a determination that the electric power needs cannot be met by facilities less degrading to the environment.

(5) Indefinite Construction Prohibition: Bills introduced in the legislatures of Montana, Nebraska, New York and Vermont contain an outright prohibition on the construction of nuclear power plants for a period of five years. They contain no provision for a determination of conditions under which construction could be resumed at the end of the five year period.

(6) Construction Only With Legislative Approval: In 1975 Vermont enacted legislation barring the construction of nuclear plants unless the legislature approves the issuance by the Public Service Board of a certificate of public good. The legislation provides no standard to guide the legislature in acting on an application other than a determination that the proposed facility would promote the general welfare. Similar bills were introduced in a number of other state legislatures in 1975.

(7) Restrictions On Location: Two bills introduced in the New York legislature would prohibit the construction of a nuclear power plant within 2000 yards from any area zoned for or being legally used for residential purposes.

C. Constitutionality of State Nuclear Moratorium Legislation

Virtually all the state initiatives described above provide for state authority to regulate the radiological health and safety aspects of nuclear power plants through outright prohibition or through power to impose conditions and to set standards that conflict with the licensing and regulatory authority of the NRC. A study of the constitutionality of these state initiatives

sponsored by the Atomic Industrial Forum and published under the title Nuclear "Moratorium" Legislation in the States and the Supremacy Clause: A Case of Express Preemption[16] concludes that the Constitution confers power on the federal government to pre-empt the field of the regulation of nuclear power plants and that in enacting the Atomic Energy Act Congress expressed its clear intent to pre-empt authority to regulate the radiological health and safety aspects of nuclear power plants. The study further concludes that the legislation is an invalid intrusion into an area specifically pre-empted by the federal government and that it would almost certainly be so declared by the courts.

D. Consent to State Regulation

The State of Vermont has employed an innovative method to achieve regulatory authority over nuclear energy facilities. The Vermont Yankee Nuclear Power Corporation signed an agreement with the State of Vermont and several conservation groups wherein it agreed to submit voluntarily to regulation by certain state agencies and to submit to state rules and regulations relating to radioactive emissions notwithstanding federal pre-emption of this area of regulation. The Company also promised to use its best efforts to obtain AEC approval of any device that would restrict emissions. At the time this agreement was entered into the Company was trying to obtain State approval for a proposed bond issue, which suggests that this was a major consideration in its willingness to submit to regulation which the State could not otherwise legally impose. The Vermont experience suggests

that states have means to bring pressure on a utility to submit to state regulation of radiological aspects of a nuclear power plant through its power to regulate in other areas and to grant or withhold benefits of value to the utility.

E. State Siting Legislation

A second category of state legislation providing authority to regulate nuclear power plants rests on much firmer legal ground than the "moratorium" legislation described above. A growing number of bills have been introduced in state legislatures in all parts of the country providing authority for states to act on matters relating to the licensing and siting of energy facilities generally. Most legislation covers all electric power generating stations, including fossil fuel and nuclear plants. A few states have enacted siting legislation. In other states bills have been introduced and are awaiting final consideration. It is reasonable to expect that many of these and similar bills will be enacted into law in view of the growing interest of state legislators and governors in enlarging state authority over the siting, construction and operation of energy facilities. Legislation in this category seeks to establish authority "to regulate activities for purposes other than protection against radiation hazards."[17] Some bills specifically exclude activities that fall within the exclusive regulatory authority of the federal government. While the bills take a variety of forms an analysis of those enacted and introduced during the past two or three years reveals a number of common features. These include the following:

(1) State Siting Authority: Legislation assigns authority and responsibility for receiving, reviewing and approving applications for permits to construct energy facilities to a state agency which may be an existing agency or one created for such purpose. In some cases the body exercising final authority includes officials or designees from other state departments and agencies and local government bodies affected by the particular application under consideration. State siting bodies are vested with broad authority to approve or deny application. All prohibit construction of a facility without a license or certificate. In some cases the authority of the agency extends not only to energy producing facilities, but also includes transmission corridors and facilities.

(2) Applications: Siting proceedings are initiated under most bills by the filing of an application which is required to furnish much detailed information. It may include a forecast of the need for electric power, other economic justification, impact on the environment including plant life, wildlife and land uses, impact on transportation and public health and safety, socio-economic impact, proximity to police and fire protection and education facilities. The application is frequently required to designate two or more alternate sites and to outline estimated plans for additional facilities that will be built during the next ten years or other specified period in the future. It may require detailed descriptions of

design features including safety systems, safeguards and evacuation plans. In some cases measures proposed to conserve energy are required to be described.

(3) Hearings: State siting bills provide for notice and public hearings on the application. In some cases, officials of certain state and local agencies are designated as parties to the hearing. Opportunity to be heard is also extended to individuals and organizations with an interest in the application or who can show that they will be affected by the approval or denial of the application.

(4) Review: State agencies are required to conduct a thorough review of the application, frequently in cooperation with other departments or agencies having specialized knowledge in a given field such as water resources, public health, etc. There must be specific findings that the need exists for the additional power and that the proposed site or sites and the plant meet criteria set forth in the law. These most commonly include a finding that the facility will not have an adverse impact on the environment, that it is compatible with the state water or land use plan and that it will not pose a hazard to public health and safety. Authority may be granted to contract with consultants for specific studies and to obtain needed information and assistance from local, state and federal agencies.

(5) License or Certificate: Following hearings and review proceedings the application may be denied, or a certificate or license issued. The certificate may contain specific conditions

or requirements that must be met in the construction and operation of the facility. State agencies may have continuing authority to monitor construction and operation of the plant to assure compliance with the terms and conditions of the certificate and it may have the power to suspend or revoke a certificate in the event of non-compliance. In some cases the legislation specifically excludes from consideration as a site areas such as parks and wilderness, recreation or wildlife refuge areas.

(6) Consolidation of Proceedings: To minimize duplication and delay in siting proceedings some state legislation provide for a single proceeding on an application resulting in the issuance of a license that is in lieu of all other licenses or permits that the applicant would otherwise be required to obtain from various state and local authorities. Legislation frequently establishes a timetable for consideration of an application and sets deadlines for certain actions and decisions. All do not require consolidated proceedings, however. In some cases the authority of state agencies exercising jurisdiction over matters relating to siting decisions to act independently is preserved.

(7) Forecasting and Planning: Several state bills require agencies responsible for siting and licensing decisions to conduct studies of the state's long range energy requirements and to forecast demand and the facilities that will be required to meet that demand. In some cases these forecasts are to be periodically updated. Some bills direct the identification and evaluation of potential sites for energy facilities. Utility

companies operating within a state are required by some legislation to prepare and file periodic reports estimating future demand, outlining long range plans to meet that demand, identifying proposed sites for future facilities and to describe plans to achieve energy conservation.

III. EMERGING FEDERAL-STATE CONFLICTS

Each category of state initiatives described above constitutes a potentially serious conflict with federal authority to regulate nuclear power plants. Each creates a somewhat different set of problems, however, and suggests a different approach in avoiding confrontation and in developing a workable system for federal-state cooperation in siting and licensing nuclear power plants.

A. State Regulation of Radiological Aspects

As has been noted, legislation which provides variations of proposed moritoria on nuclear power plants, mostly in the form of ballot propositions, is probably an unconstitutional attempt to give states power to regulate in an area that has been specifically pre-empted by the federal government. The likelihood that the courts would uphold federal authority by striking down any such legislation that should be enacted and implemented is the source of little comfort, however. Such action could only come after litigation that may be protracted and costly, and at a minimum would add confusion, delay and uncertainty to an already complex and lengthy licensing and siting process. A decision by a state whether by vote of the people or the

legislature to assert regulatory authority over nuclear energy facilities is an expression of the political will of that state even though it may be unconstitutional by reason of the pre-emption of this area of regulation by the federal government. Defeat of the states in the courts would almost certainly stimulate greater efforts to obtain a political remedy through federal legislation granting the states specific authority to regulate the radiological aspects of nuclear power plants.

Two bills with that objective were introduced near the end of the 94th Congress.[18] Both would give the states a veto right over nuclear power plants. The first prohibits the NRC from issuing a construction permit until the state where the facility is to be located has given its approval to the project. The second gives the state ninety days to disapprove a license after it has been issued by the NRC. In both cases the state could impose safety and other criteria that are stricter than those required by the NRC. While there was no action on these bills in the 94th Congress support for passage of similar legislation in the future will probably grow as more states seek a larger role in decisions involving nuclear power plants.

B. State Licensing and Siting

Legislation enacted and proposed providing authority for states to regulate nuclear power plants "for purposes other than protection against radiation hazards" is founded on much more solid legal ground but presents problems that are potentially more troublesome than those in the first category described above. State authority over land, water and other

natural resources within its borders is broad. Protection of the health and welfare of its citizens has long been recognized as a proper function of state government.

In recent years a number of legislative and administrative actions reveal a federal policy of actively encouraging state initiative in many areas such as land use planning and in the establishment and enforcement of standards for protection of the environment. Passage of the Coastal Zone Planning Act[19] is an example of a federal effort to develop cooperative programs with coastal states under which the states accept responsibility for the management of designated areas to prevent degradation.

For the most part state legislation duplicates the two-step licensing process followed by the NRC. In its application to the NRC for a construction permit and for an operating license an applicant must demonstrate that the proposed nuclear power plant meets certain design standards and that its operation will be consistent with the protection of public health and safety. At both stages the application is subject to careful review of all aspects including radiological and environmental. A public hearing at the construction permit stage is mandatory. A further hearing may be ordered at the operating license stage. After the operating license is issued the NRC retains jurisdiction to monitor operations and has authority to require modifications to improve protection of public health and safety. It is in the area of the review of environmental aspects other than radiological hazards that there is the greatest overlap

between federal authority and that assigned to the states under legislation that has been enacted or is proposed.

At best, therefore, an applicant for a license to build and operate a nuclear power plant is confronted with the necessity of filing and prosecuting applications at both the state and federal level which are the subject of comprehensive review and public hearings by the NRC and the state in which the plant is to be located. Under the most favorable circumstances this duplication of procedure increases the costs to the applicant and will almost certainly lengthen the time between the initial application for a construction permit and the commencement of operations.

At worst, the exercise of regulatory authority by the federal government and the states could create conflicts that would make it impossible or impractical for a utility to build a nuclear power plant. An applicant could be faced with the prospect of being unable to comply with inconsistent requirements established under state and federal authority. Each could effectively veto the action of the other. The NRC can deny a license to an applicant notwithstanding state approval. And, a state could probably make it impossible for an NRC-approved plant to be built through the exercise of its power to control land use, water, access affecting the proposed plant site and the transmission corridors.

A recent Oregon experience illustrates the potential of a state to delay the NRC proceeding on an application for a construction permit for a nuclear power plant. The State of

Oregon intervened in federal licensing proceedings involving proposed Sedro Woolley and Pebble Springs nuclear power plants. The Atomic Safety and Licensing Board of the NRC recessed hearings in August 1976 until a final forecast of energy needs is completed by the Oregon Department of Energy, which was not expected for several months.

IV. MECHANISMS FOR COOPERATION

A number of approaches have been suggested to resolve or avoid federal-state conflicts in order to permit nuclear power plants to be built and licensed on a timely basis. These include further federal pre-emption of state authority, coordination of state and federal regulatory activities and the passage of comprehensive federal legislation that provides for a state role in a system of joint proceedings on an application.

A. Federal Pre-emption

Congress could enact legislation expressing a clear intent to pre-empt for the federal government the authority to regulate for such purposes other than protection against radiological hazards that may be permitted under its constitutional powers to regulate interstate commerce. This is neither a practical nor satisfactory solution, however. In view of expected and understandable resistance by the states to such a move, the prospects for passage of such legislation in the present climate are almost non-existent. Whether the federal government could

under the Constitution, even if it wanted to do so, pre-empt all activities that affect the siting, licensing and operation of nuclear power plants is questionable.

B. Coordination of Federal-State Actions

The NRC has initiated a number of steps to foster cooperation with the states in power plant siting matters. During each of the past two years it has sponsored conferences on power plant siting with participants from the states and federal agencies to examine problems and potential conflicts and to make recommendations that would improve cooperation between the federal government and the states. The NRC has recently established a separate office to administer state programs. Among NRC actions instituted in recent months are improved liaison and information exchange with states on siting matters and joint hearings on applications.

(1) Information Exchange: Among the recommendations of the 1975 Federal-State Conference on Power Plant Siting that have been implemented include wider exchange of information relative to applications for a permit to build a nuclear power plant. Liaison officers are to be designated by the NRC and by the state where the plant is to be located to facilitate the information exchange and to coordinate the activities of both. This cooperative effort is directed primarily at matters such as the environmental review process that come within the jurisdiction of the states and the federal government.

(2) Joint Hearings: To avoid costly and time consuming duplication in the hearing process the NRC has initiated a procedure for joint hearings with Maryland and New York on license applications. Joint hearings were announced for the NRC and the State of Maryland to receive evidence and testimony from interested parties on the application of Potomac Electric Power Company permits to build its proposed two-unit Douglas Point Nuclear Generating Station at a site in Charles County.

A more formalized approach was proposed for the joint hearings with the State of New York on the application of the Power Authority of the State of New York for a permit to build its proposed Greene County Nuclear Power Plant. A draft protocol was published by the NRC for comment. It defined the hearing bodies, provided for separate filing by each of the bodies on procedural questions, for the receipt of evidence on matters outside the scope of NRC specifications of controverted issues and for ruling on objections to evidence. The basic objective of the joint hearings is to deal with matters that will satisfy both NRC and state requirements. While it is anticipated that the hearings will take longer than would be required by the NRC for its own purposes, they will effect a considerable saving in time over that required for separate NRC and state hearings.

The joint hearing technique is a constructive step which will undoubtedly provide experience that will be of great value in structuring future such hearings and in the drafting of federal legislation formalizing the procedure.

C. Federal Siting Legislation

Another proposed alternative to reduce or eliminate federal-state conflicts is the passage of comprehensive legislation at the federal level to define more clearly the role of federal and state agencies in siting and licensing proceedings and to set forth a procedure designed to improve and expedite the process. An example of legislation intended to accomplish these purposes, prepared by Executive branch agencies in draft form primarily for discussion and review by the states and federal agencies, is the proposed "Electric Energy Facilities Siting Act of 1976." The bill assigns to the FEA primary responsibility as the coordinating agency.

States are encouraged to participate through development grants by the federal government which may cover up to two-thirds of a state's costs in establishing a siting development program. Thereafter, a state may qualify for administrative grants covering up to two-thirds of the cost of administering its siting program.

Programs developed by the states are to be submitted to the Administrator of FEA for review in consultation with NRC, ERDA, the Council on Environmental Quality (CEQ), the Federal Power Commission (FPC) and the Department of the Interior. The Administrator must approve the program submitted by a state unless it fails to meet criteria set forth in the legislation. Among the requirements provided are that it contains review and certification procedures for the location of a facility within the state, designates a responsible state lead agency and

establishes guidelines and standards that permit an applicant to submit its long-term plans for approval. Under its proposed program a state must take into account such factors as cooling system requirements, proximity to load center, navigable waters and transportation, soil and foundations, availability of water, land use, population density, accessibility to transmission lines, environmental impact and the need for electric power. There must be provision for collection of a reasonable filing fee to cover certain state expenses in connection with the application, for joint federal-state hearings with opportunity for participation by parties showing a substantial interest in the outcome, for a time limit for completion of proceedings and for administrative review. This is to be the sole procedure for certification by the state and any of its departments, agencies or subdivisions.

The proposed legislation also provides for distribution to all interested federal agencies of copies of the application and certain other documents and for their participation in a joint hearing. It provides for a specific pre-emption to the NRC of exclusive responsibility for radiological health and safety conditions.

The proposed legislation was not submitted to or introduced in Congress. However, bills were introduced in the 94th Congress containing a provision for the NRC in cooperation with other federal and state agencies to

> . . . conduct a study of methods to improve further the procedures for Federal and State participation in the review and approval, in areas other than protection against radiation hazards and protection of the common defense and security, of sites for utilization or production facilities.[20]

Methods for coordinating and reaching environmental decisions were to receive particular attention. The Chairman of the NRC was directed to submit the results of the study and recommendations for legislation to Congress.

These bills were not enacted before the adjournment of the 94th Congress. However, the NRC took note of the need for the proposed study and in October 1976 announced a plan for a study similar to that proposed in these bills to be completed before mid-1977.[21] The stated objectives of the study are (1) to identify key procedural and jurisdictional activity involved in reaching environmental decisions and to relate this activity to federal, state and private actions involving siting reviews, (2) to determine the extent to which coordinated activities and long-range planning actions affect the efficiency of environmental decision-making, (3) to analyze options for coordinating and reaching environmental decisions more efficiently, and (4) if appropriate bases can be justified, to recommend legislative options to Congress and changes in site approval procedures of federal and state agencies.

V. CONCLUSIONS AND RECOMMENDATIONS

Increasing activity by the states in the passage of power plant siting legislation to extend authority in areas of

legitimate interest and concern to the states has placed them on a collision course with the NRC and other federal agencies exercising regulatory authority over the same subject matter. Failure to recognize the growing potential for conflict and to take positive steps to bring about cooperative action will increasingly frustrate both the federal government and the states in carrying out their respective statutory responsibilities. It will raise formidable obstacles to the attainment of the nation's goals.

Steps that have been taken, as noted above, to avoid conflicts and to reduce duplication and delay through better coordination of federal and state activities are constructive and should be encouraged. These measures do not provide a long-term solution, however. Their success and effectiveness depend to a large extent on the willingness of those at the state and federal level at a given time to enter voluntarily into cooperative arrangements. There remains a large element of uncertainty for an applicant for authority to build and operate a plant concerning the procedures that must be followed, the requirements that must be met and the time within which it can reasonably be expected that all decisions will be made.

The enactment of comprehensive federal legislation offers the best and possibly the only hope for a long-term solution. The drafting of such legislation should be undertaken following wide ranging discussions between representatives of the states and the federal agencies most directly involved. An effort should be made to reach the widest possible area of agreement

on the specific authority and responsibility of each in siting and licensing proceedings.

Federal legislation might take alternative approaches. It may seek to define clearly the areas of primary responsibility for the federal government and the states. For example, the pre-emptive authority of the federal government with respect to the radiological health and safety aspects of nuclear power plants may be affirmed while the states are assigned primary responsibility with respect to other environmental and socio-economic considerations. Such legislation might establish the institutional mechanisms and procedures that provide for matters such as a single application, joint hearings and a schedule for the making of all decisions and the completing of all steps relating to the siting and licensing of facilities. Federal legislation may also provide incentives for state cooperation through cost sharing arrangements or other forms of assistance to the states.

The success of this approach, however, depends on the willingness of all states to agree to and accept the delineation of authority provided in the legislation. This would involve a withdrawal by many states from areas where they are increasingly asserting regulatory authority. In the absence of such agreement to be embodied in legislation, constitutional questions would remain to be resolved in the courts on a case-by-case basis.

A more practical approach would be through the passage of federal legislation providing for state involvement on a regional basis. There is need for greater state involvement within a framework which clearly defines the areas of state and federal authority and which does not permit an individual state to veto decisions reached by the states collectively within a region.

Such an arrangement will require the passage of legislation pre-empting to the federal government authority to regulate the siting, licensing, construction and operation of nuclear facilities in all matters relating to public health and safety including environmental and socio-economic factors. Such legislation should also delegate back to the states broad authority to regulate in these matters, but through a regional organization established through an interstate compact approved by Congress. The regional organization would be a regulatory instrument of the federal government but the states acting collectively would have a large voice in decisions relating to the need for and siting of nuclear facilities.

The study being conducted by the NRC is a constructive step. There is an urgent need for Congress to enact legislation providing support and direction for the expansion of the study. Potential for arrangements that will facilitate the cooperation of states in a region to be served by energy facilities should be examined. The study should also provide for the joint participation by the states, federal agencies and the Congress in drafting proposed legislation.

Prompt attention should also be given to the development of a plan incorporating the regional concept outlined above and legislation to implement the proposal should be prepared for early consideration by Congress.

Time is of the essence in the passage of legislation. Within the next two or three years most of the fifty states will probably have enacted legislation establishing mechanisms and procedures for making decisions relating to the siting of nuclear power plants. There is a high probability that provisions of these state laws will vary widely increasing the difficulty of achieving uniform procedures of general applicability to the states and the federal government. Prompt passage of legislation prepared with active state participation can help greatly to shape state legislation and to achieve some degree of uniformity among the laws and procedures of the states.

Current and proposed efforts should be directed toward the preparation of proposed legislation during the next few months in order that it can be submitted to the Congress for final action well before the adjournment of the 95th Congress.

FOOTNOTES

[1]U.S. Const. art. I, sec. 8.

[2]Ch. 724, 60 Stat. 755.

[3]Ch. 1073, 68 Stat. 919, as amended, 42 U.S.C., sec. 2011-2296.

[4]Act of September 23, 1959, P.L. 86-373, 73 Stat. 688, 42 U.S.C., sec. 2021 (1970).

[5]42 U.S.C., sec. 2021(k).

[6]42 U.S.C., sec. 2018.

[7]Maun v. United States, 347 F. 2d 970 (9th Cir. 1965).

[8]Act of August 24, 1965, P.L. 89-135, 79 Stat. 551.

[9]Northern States Power Co. v. Minnesota, 320 F. Supp. 172 (D. Minn. 1970), aff'd 447 F. 2d 1143 (82 Cir. 1971), aff'd per curiam 405 U.S. 1035 (1972).

[10]42 U.S.C.A., sec. 5801-5891.

[11]Colorado Public Interest Research Group v. Train, 507 F. 2d 743 (10th Cir. 1974), cert. granted 421 U.S. 998 (1975), 426 U.S. 1 (1976).

[12]42 U.S.C., sec. 4321-4349 (1970).

[13]33 U.S.C., sec. 1251-1376 (1973).

[14]P.L. 93-275, 88 Stat. 96, 15 U.S.C., sec. 761-786 (1974).

[15]Ch. 606, Oregon Laws of 1975.

[16]Arthur W. Murphy and D. Bruce La Pierre, Nuclear "Moratorium" Legislation in the States and the Supremacy Clause: A Case of Express Preemption, (Washington, D.C.: Atomic Industrial Forum, 1975).

[17]42 U.S.C., sec. 2021(k).

[18]H.R. 15274, H.R. 15275, 94th Cong., 2d sess. (1976).

[19]P.L. 92-583, 88 Stat. 1280, 16 U.S.C., sec. 1451-1464 (1972).

[20]H.R. 13512, S. 3286, 94th Cong., 2d sess. (1976).

[21]U.S., Nuclear Regulatory Commission, Office of State Programs, Efficiency in Federal/State Siting Actions, NUREG-0128 (1976).

THE ENERGY PARK EXPERIENCE IN PENNSYLVANIA

List of Contents

Page

1. ABSTRACT 229
2. TEXT 230
   - A. Background and chronology. 230
   - B. Public participation 239
   - C. Analysis of key groups 245
   - D. Conclusions and implications 251
3. APPENDICES 257
   - A. Timetable
   - B. Map
   - C. Energy park fact sheet
   - D. Text of Governor's Energy Council decision
4. REFERENCES 265

THE ENERGY PARK EXPERIENCE IN PENNSYLVANIA

PREPARED BY
DR. FRANK CLEMENTE AND DR. TERRY A. FERRAR

ABSTRACT

This paper presents a history and an analysis of the events surrounding the Energy Park controversy in Pennsylvania from June 1973 to the present. In the Pennsylvania case, Energy Parks were defined as clusters of 10,000 (MW(e) to 20,000 MW(e) of generating capacity in a relatively small geographic area. A group of four utilities in the Commonwealth presented the concept to the Governor's Energy Council in January 1975. Ten non-metropolitan areas in the state were identified as potential sites.

The Governor's Energy Council conducted a series of public information and input meetings at each site during 1975. Overt response to the concept was overwhelmingly negative. Since no objective surveys were conducted, however, this negative reaction cannot be taken as representative of public opinion at large.

On January 23, 1976, the Council voted to suspend study of the concept and refer the generic questions of energy facility siting to the legislature. At the present time, there is no on-going research specifically on the concept by either the Commonwealth or the utilities.

THE ENERGY PARK EXPERIENCE IN PENNSYLVANIA

PREPARED BY
DR. FRANK CLEMENTE* AND DR. TERRY A. FERRAR**

This paper presents a history and an analysis of the events surrounding the Energy Park controversy in Pennsylvania from June 1973 until the present. The major goals of the report are threefold. First, to provide an objective and accurate chronology of events and to identify major actors in the drama. Second, to describe the process of public participation in the debate. And, third, to evaluate the role of key groups in this particular energy-related controversy.

At the outset it should be stressed that the paper is based on the assumption that the Pennsylvania experience has profound implications for other states considering energy centers as well as for the federal government. Indeed, the Pennsylvania situation provides insights into the sociopolitical dimensions of all types of energy facility siting whether they be centers, "quads" or mini-plants.

Background

In June 1973 a group of four electric utilities--Philadelphia Electric, Pennsylvania Power and Light, Metropolitan Edison and Pennsylvania Electric--began to investigate the feasibility of

*Senior Research Associate, Center for the Study of Environmental Policy, The Pennsylvania State University, University Park, Pa.

**Director, Center for the Study of Environmental Policy, The Pennsylvania State University, University Park, Pa.

aggregated power plant siting in Pennsylvania. These four utilities, which together service 70 percent of the Commonwealth, commissioned an internal study of concentrated siting. In March 1974 system planners within the organization completed the report "Energy Parks in Pennsylvania--Where-When-How?". This report was distributed to managers of the four utilities, but it was not released to the public until January 1975.

In this report energy parks were defined as clusters of 10,000 megawatts to 20,000 megawatts of generating capacity in a relatively small geographic area. The report recommended further study of the concept. Officials of the four utilities accepted the recommendation and in June 1974 they formally established the Energy Park Development Group (EPDG). The original project manager of EPDG was Edward F. Reis of Pennsylvania Power and Light. Reis was succeeded by John H. Saeger of Pennsylvania Power and Light. The assistant project manager was Richard Mulford of Philadelphia Electric. In addition, the EPDG consisted of two task forces. Mr. J. R. Thorpe of GPU Service Corporation headed the Site Identification task force, and Mr. R. W. Werts of GPU headed the Transmission task force.

The Site Identification task force was guided, according to the utilities, by the following series of "ground rules":

(1) Energy park locations should not preempt prime farmland (if possible) or lands planned for governmental use.

(2) Energy park locations should avoid:

(a) Densely populated areas,

(b) Flood plains,

(c) Regulated air basins, and

(d) Areas of extensive power plant development.

(3) Energy park locations should have:

(a) Suitable topography,

(b) Rail and road access,

(c) Acceptable atmospheric conditions,

(d) Compatible land use, and

(e) A minimal ecological disturbance.

In order to facilitate the site identification process, EPDG hired Gilbert Associates of Reading. The Gilbert firm had previously done work for the utilitis and had already engaged in a siting effort for Pennsylvania. Mr. Mike Cambria managed the project at Gilbert and in November 1974 this group completed their report Energy Park Development, Site Identification Study.

While many aspects of the Gilbert report are important, the following items are essential for a thorough understanding of subsequent events:

(1) An energy park was defined as 10,000 to 20,000 megawatts of concentrated generating capacity. The fuel source would be 50 percent fossil and 50 percent nuclear.

Start-up dates would be 1985 for first coal unit and 1987 for first nuclear unit.

(2) Ten potential sites and fifty-two additional locations within the state were identified (see attached map). The ten sites were divided into three groups. Group 1 contained three sites with few major deficiencies (LeRaysville, Ararat, Montour). Group 2 contained five sites with some problems, but where construction was still feasible (Clermont, Cherry Flats, Sheakleyville, Pine Glen, Donegal). Group 3 contained two sites with a serious deficiency where construction would probably not be possible (Lake City, Tobyhana). All potential sites were in rural or semi-rural areas.

(3) The Gilbert report projected a new population of 25,980 for a 20,000 MW(e) park. Of these, Gilbert projected 6,950 school children who would need 277 new school rooms. In addition, the Gilbert report projected 9,070 new jobs in a community as the result of the park.

On January 17, 1975, Reis, Thorpe, Cambria and Werts presented the energy park concept, the Gilbert study, the original utility report and a transmission study to the Governor's Energy Council (GEC) in Harrisburg. The GEC consists of members of industry,

academia, government, and is chaired by the Lieutenant Governor. The self-definition of the GEC is as follows:

> The Governor's Energy Council was established by Executive Order of Governor Shapp in February 1974. The purpose of the Council is to strengthen the capacity of the Commonwealth to respond to the complex problems related to energy. The Council is the principal authority within the Commonwealth for all aspects of energy policies and programs. It has the authority to exercise control and coordination necessary to insure the proper management of energy use, conservation, and production throughout the Commonwealth.

In practice, the GEC is an arm of the Governor's office and provides input on key energy-related issues.

The EPDG presentation to the GEC was important for at least two reasons:

(1) It was the first time the concept reached the public, and

(2) The key terms were now defined in the public eye, and thus more or less cast in stone.

Reis, the EPDG project manager, defined an energy park as a concentration of electric-generating capability in a relatively small geographic area. He emphasized that his goal was to bring the GEC up to date on EPDG efforts and that the concept was still in the study phase. Reis pointed out that there was not commitment to build an energy park but only to determine if it was a viable alternative to dispersed power plant siting.

Reis projected a 5.9 percent annual growth rate in electricity load during the 1984-2000 period. He pointed out that this projection was compatible with the GEC's own data. An energy park, Reis pointed out, would be one means of meeting this demand.

He described a variety of potential benefits from the concept:

(1) More effective land use.

(2) Minimization of siting and licensing efforts.

(3) Standardization of engineering and construction.

(4) Labor force stability.

(5) Efficient utilization of support services.

(6) Flexibility in matching capacity growth to load requirements.

(7) Potential savings to consumer.

Potential problems identified by Reis were:

(1) Getting public acceptance.

(2) Site selection and acquisition.

(3) Heat dissipation.

(4) Financing.

In general, Reis concluded, EPDG felt that the potential benefits far outweighed the possible problems. Further, none of the potential problems seemed insurmountable. He asked the GEC to work with EPDG in setting up public information meetings as a first step in developing a site selection process.

After the EPDG presentation, the GEC voted unanimously to participate in further Energy Park planning and research as the coordinating agency for the Commonwealth. The GEC gave three reasons why it should be involved in the study process:

(1) To coordinate the efforts and facilitate the exchange of information on the concept and the study and evaluation of the concept among the State agencies involved and between the public, the electric utilities and other non-State government groups and these State agencies.

(2) To enable the State, in addition to the utilities, to become involved in the study process itself.

(3) To provide the means for public involvement in the study the Governor's Energy Council is setting up a series of public meetings to help satisfy this responsibility.

The first public information meeting was held January 30 in the William Penn Auditorium in Harrisburg. Many environmental groups were represented, and it became obvious that the concept was going to generate considerable controversy. Plans were then made to schedule meetings in all ten potential sites. The staff of the GEC took the lead in scheduling meetings. The GEC Executive Director, William Harral, took a very active role in the process. In addition, another staff member, Herbert Jacobs was appointed "Energy Parks Coordinator" on a full-time basis. These individuals spoke at public meetings, answered letters and phone inquiries, and generally provided a sounding board for complaints and questions from the public, government officials and special interest groups.

The GEC also addressed the issue from the technical side. The Center for the Study of Environmental Policy at The Pennsylvania State University contracted with the GEC to undertake a multidisciplinary study of the Energy Park concept. This investigation was conducted by economists, engineers, sociologists and geographers under the direction of Dr. Terry A. Ferrar.

In August, the Center's two volume report was released under the title Energy Parks and the Commonwealth of Pennsylvania--Issues and Recommendations. This report identified several major technical issues which were unresolved or inadequately treated in the Gilbert study. It was recommended that site-specific investigations be undertaken to obtain necessary data.

By Christmas 1975 the state had held public meetings at all ten potential sites, the Penn State report was completed and the GEC had access to a wide range of information on the Energy Park question. On January 23, 1976, the GEC met in Harrisburg and agreed to:

(1) Suspend study of the Energy Park concept until larger issues could be resolved. These issues included the proposed "Clean Air Amendments" and the broad questions of utility taxes and concentrated siting of nuclear power plants.

(2) Present a resolution to the Legislature asking that research be undertaken on all facets of energy facility siting.

After the GEC decision, the EPDG announced suspension of its activities. In a news release Saeger said, "We've gone as far as we can at this time." He called on the legislature to take action to resolve the unanswered questions regarding Energy Parks. Finally, he praised the GEC saying "in perhaps no other state has a group like the Energy Council come forward to involve the public in deciding on energy facilities."

At the present time, the energy park question is in limbo. The GEC has extricated itself, the EPDG is in a holding pattern and the legislature is unlikely to move rapidly in an election year.

PUBLIC PARTICIPATION

One of the most fascinating aspects of the energy park experience in Pennsylvania was the high degree of public visibility of the concept. The proposal became the subject of debate throughout the state in general and in the ten potential host counties in particular. Many arguments, both pro and con, were articulated at a series of public meetings in each of the ten candidate counties. Basically, there were two kinds of meetings:

(1) Public Information Meetings where experts and professionals spoke on the potential effects of the proposed facility. These meetings were coordinated by local community leaders and planners and Penn State Extension personnel. Speakers were drawn from a wide range of fields including nuclear engineering, biology, geology, economics, sociology and environmental studies. Other speakers represented the GEC the local government, various state agencies, the power companies, Gilbert Associates, and the Center at Penn State.

Such meetings were held at all ten sites during the period May-November 1975. Some counties held as many as eight or ten open meetings.

(2) Public Input Meetings were held by the Governor's Energy Council subsequent to the series of informational meetings.

At least one input meeting was held in each county. Statements, suggestions and conclusions were solicited from all interested citizens. Planning boards, local officials, interest groups, union leaders and many other segments of the communities (including private citizens) presented statements. Each meeting was attended by at least one representative of the Governor's Energy Council.

Significant public reaction emerged in each of the ten counties. These responses occurred along several dimensions:

(1) Dozens of citizens attended the public meetings, asked questions and made statements for or against the proposal.

(2) Organizations formed to either combat or facilitate construction of the facility. Private meetings were held to discuss strategy. Letters were written to the Governor, local officials and the newspaper. Petitions were circulated. Bumper stickers appeared on local automobiles.

(3) The media covered the story very thoroughly and local newspapers often ran feature articles on the controversy. Editorials were written pro and con. Local radio stations interviewed experts, local leaders and "the man on the street." The Pennsylvania Television Network produced a special program on the "Energy Park Controversy."

(4) Local officials took stands on the issue. Planning agencies and boards wrote reports, held meetings and presented their conclusions at the public input forums,

As both the EPDG and the GEC readily admit, the overt public response was negative. One EPDG official estimated that about 97 percent of the public input was against the concept. Unfortunately, it is far beyond the scope of the present project to analyze and interpret this input. It is possible, however, to give a brief overview of the major types of criticisms which emerged at the public meetings:

(1) Anti-nuclear--the definition of the energy park included a 50 percent nuclear component. This nuclear aspect generated vocal opposition to the concept in public meetings at both the state and local level. The Environmental Coalition on Nuclear Power, for example, was one of the main groups opposing the concept.

(2) Environmental Impact was also a major point of contention. Fishing clubs, farmers and many environmental groups claimed the park would have adverse ecological effects.

(3) Community Impacts was another major area of concern--particularly at the local level. The Gilbert report

projected a new population of over 25,000 people. This figure resulted in much consternation among residents of these rural areas.

(4) Equity Issues--Some residents claimed that under the Pennsylvania tax system local communities do not receive a "fair" proportion of tax revenuew from power plants. In Pennsylvania, utility tax revenues are redistributed according to the "local tax effort" of a jurisdiction. As the Pennsylvania Environmental Council has correctly pointed out:

> "It is the metropolitan areas of the state, with their immense base of locally tax-subject property, which benefit from the Public Utilities Realty Tax."

In other words, while rural areas would have the "burden" of energy parks, the metropolitan areas would receive most of the tax revenue.

Another "equity" issue which consistently appeared related to why no metropolitan areas were included in the potential sites. Many speakers at meetings said that the EPDG thought "our lives are worth less" than city dwellers. They resented the implication that large cities had been avoided in site selection because the

energy parks were dangerous. The fact that energy produced at the park would be transmitted to the cities did not lessen their irritation with the concept.

(5) Need was called into question by many citizens making input. Some environmental groups challenged the EPDG's 5.9 percent growth rate. They argued that conservation efforts should be emphasized and this would sharply curtail the 5.9 percent growth projections.

There were, of course, many other criticisms of the energy park concept, e.g., susceptibility to sabotage, unaesthetic, not suited for rural areas and the fact that alternative forms of energy were not considered. A much needed research study is the thorough analysis of the hundreds of letters, petitions, statements and articles that were written on the subject.

Just as there were negative comments on the Energy Park concept, so were there some positive responses. In general, the major positive reaction which surfaced at the public meetings related to projections that the economy of the local area would be stimulated by the construction of the park. Jobs would be created and business would prosper. Several labor unions were very supportive of the concept (e.g., IBEW locals). In addition, Chambers of Commerce officials and local development groups generally supported the idea. This positive perspective, however, was definitely in the minority.

In sum, then, public involvement in the process was largely confined to a long series of public meetings in each candidate county. Given the number of meetings, the time span and the publicity the meetings received, it is likely that all interested individuals and groups had the opportunity to learn about the concept and to make input to the GEC.

ANALYSIS OF KEY GROUPS

This section provides an interpretation of the role and behavior of three key groups in the Energy Park controversy. It is subjective to the extent that it is interpretative. The following remarks are intended as neither an apologia for or condemnation of any groups:

(1) The EPDG, representing the utilities, first brought the concept to the public attention by presenting it to the GEC. They came to the GEC, as they readily admitted, for help in pursuing a new concept in power plant siting. The EPDG confessed they did not have all the answers but felt, in Reis' words that "there is a definite need for state and public participation in the process".

Given the early stage at which the EPDG went public, it is surprising that in the subsequent public meetings the EPDG was often criticized for having already chosen the site and, in one case, of having already purchased land. There is no evidence that such charges had any foundation. In fact, all available evidence suggests that the EPDG acted in good faith in bringing the public into the process at an early stage.

At the present time, many utility officials believe that the public was brought into the act at too early a stage. The concept was still abstract and its very abstraction allowed for unreasonable or irrelevant criticism. For example, a professor of history at the University of Pittsburgh stated that within fifty years energy parks would occupy one-fifth of all land in Pennsylvania.

The question of going to the public too early aside, however, it is reasonable to conclude that the EPDG made at least two other mistakes:

(a) EPDG underestimated the difficulty in obtaining public acceptance. The EPDG growth estimates were challenged, anti-nuclear and environmental groups showed strong organization and a general distrust of big business was readily apparent. The EPDG clearly suffered from a credibility problem.

(b) EPDG did an inadequate job on the technical side. Subsequent research brought some key EPDG points into serious question. Discrepancies between the Gilbert report and the Penn State study were often delineated at the public meetings. Critics of the

concept used these discrepancies to cast doubt upon the entire Gilbert report.

In sum, then, there is no objective evidence to indicate EPDG was attempting to "put one over" on the public. By the same token there is reason to conclude that EPDG suffered from poor public relations, questionable input from consultants and the general erosion of faith in large institutions and business.

(2) The GEC, by its own volition, acted as coordinator of the Energy Park public meetings. As Saeger pointed out, probably no other state has had a comparable public airing of such a major issue. The GEC can claim responsibility for the public meetings and for the fact that all sectors of the Commonwealth population had an opportunity to make input to the Council.

Further, the GEC staff, especially Harral and Jacobs, were intimately involved in the process. They attended public meetings and answered both reasonable and unreasonable questions with equal aplomb. In the public mind these two men had been identified with the concept and both suffered a certain amount of personal abuse from the more hostile critics at the public meetings.

Despite these efforts, however, an aura of incompleteness still surrounds the process. At the present time, the energy park issue is unresolved. None of the combatants is happy. The utilities say an exciting new concept is stuck in a quagmire. At the same time, some environmental groups charge that the energy park study is going on at a sub rosa level. In other words, the mutual distrust between opposing factions in the Commonwealth was exacerbated, rather than mitigated, by the public hearings.

The GEC formally saw public meetings as providing the opportunity to special interest groups and concerned citizens to make input regarding the concept. This, of course, is a legitimate use of the meeting process. De facto, however, the meetings were interpreted as indicators of general public opinion, because no other "hard" data were available. This is not to say that the GEC is politically naive, but merely that it quite possibly did not obtain an accurate picture of public opinion.

As an aside here, it is important to note that the authors know of no scientific survey conducted in the prime candidate counties. Thus, there is no objective

index of general public reaction. The only adequate data which are available are from a survey of adult residents in Indiana County in the summer of 1975. Respondents were given the definition of an energy park and asked if they would oppose construction of such a facility. Less than 33 percent opposed the concept. Indiana County was not one of the prime sites, but was in the list of sixty-two sites identified in the Gilbert report.

(3) Environmental groups were integrally involved in the public meeting process. As a heterogenous state, Pennsylvania has a wide variety of environmental organizations ranging from Trout Unlimited to various antinuclear groups. All of these organizations were opposed to the concept and made critical statements at the public meetings.

A certain degree of coordination and cooperation between groups occurred across the state. In fact, the Energy Park controversy has served to spur interaction between groups previously ignorant of one another's existence. In this way, the situation has stimulated the environmental movement in Pennsylvania. Further, as was previously pointed out, many environmentalists do not believe the energy park study has been

terminated, but rather is being carried on under the table.

The environmental groups, both established and ad hoc, provided vocal and solid opposition to the Energy Park concept. These special interest groups can be credited, for better or worse, with stalling further investigation of the concept.

One complaint which has been lodged against some environmental groups should be mentioned here. Specifically, representatives of certain groups traveled from site to site and made basically the same criticisms at all ten sites. To a real extent, then, these groups presented an intrusion into the public hearing process at the local level. In the words of one EPDG official, some environmentalists played the role of "truth squad" and continually brought up their own criticisms of the concept at every site.

CONCLUSIONS AND IMPLICATIONS

Based upon the foregoing discussion, it is possible to draw several conclusions and to derive implications for other states considering similar policy questions:

(1) The EPDG did a poor job in both presenting the concept to the public as well as in studying the technical issues involved. EPDG officials now believe that the concept would have had an entirely different reception had it been initially presented in an area of high unemployment. This hypothesis is supported by many studies of public attitudes toward industrial development. Adequate public relations could have made an energy park appear as a boon rather than a burden to the local community.

As was mentioned earlier, socioeconomic impact was one of the major concerns at the local level. Neither EPDG or Gilbert Associates were prepared to answer questions in this area.

(2) The GEC did a good job in setting up public meetings but did not supplement the results with more objective indicators of public opinion. The negativity of the public at the meetings predominated and gave the impression that "almost everyone was against it." When, in reality, all

the GEC knew was that almost everyone who attended the meetings was against it.

This conclusion has clear implications for obtaining measures of public opinion. It must be emphasized that the members of the GEC all recognized the inherent bias of public meetings and that the results could not be taken as indicative of the community at large. The point is that when push came to shove, the GEC had no objective survey of public opinion to compare to the results of the input meetings.

(3) Both the EPDG and the GEC suffered from severe credibility problems. Some residents in all ten counties were convinced that their county had already been selected as a site and that the public meetings were mere charades being conducted by the state and utilities. Much has already been written about the erosion of trust in government and big business. The Pennsylvania situation, however, is an operational example of the ramifications of this distrust.

(4) Energy facility siting proposals are vulnerable to attack on a wide variety of fronts. As was mentioned earlier, nuclear, environmental, socioeconomic and taxation

criticisms were only a few of the negative responses to the energy park question. Given the breadth and complexity of these problems, it is possible that a proposed energy park could be delayed indefinitely by intervenor suits. The public meetings in Pennsylvania served to highlight the fact that there are a myriad of special interest groups who could provide an insurmountable obstacle to the concept.

(5) Far from creating a climate of compromise, the public airing of the energy park concept actually increased hostility to the utilities and the state. In the ten counties, all new development is now challenged as the "first step toward an energy park." In central Pennsylvania, for example, a proposed dam by the U.S. Army Engineers has been accused of being planned to provide water for an energy park in Centre County (Pine Glen site).

General Conclusion

Previous sections have characterized an investigation conducted by concerned government and utility officials on the energy park concept. The intent of these activities was to delineate the effects of alternative decisions. This work, together with

federally sponsored research, resulted in the unanimous conclusion that no overriding impediment was identified that suggested this concept was either infeasible or impractical. Without exception, these independent research teams concluded that further site-specific study was desirable.

Reflecting upon these Pennsylvania experiences, it is essential to appreciate that the overt public response to this concept investigation effort has thwarted the recommended site-specific studies. In light of this result, officials must ask, "How can informed public input be obtained without producing the side effects of unsubstantiated pressures for premature unilateral decision making?".

The Pennsylvania hearings were conducted to assist state and utility officials in perceiving the array of citizen concerns relevant to the siting of energy parks. As such, the gatherings were informally structured in order to encourage comprehensive discussion of this issue. The open meeting design, however, permitted much broader considerations to enter the debate, and realizable options to energy parks were ignored in favor of panacea answers. The activities of "anti-groups" (e.g., anti-nuclear, anti-growth) tended to encourage the public to consider these unachievable, but consoling options. This suggests that in designing public participation forums officials must recognize the trade-off between the comprehensiveness of dialogue, as achieved by informal meetings,

and the consideration of relevant alternatives. In this interest, it may be necessary to confine discussion to prespecified options, as was recently done in Minnesota hearings on siting.*

A mechanism to permit continuous public involvement in energy planning may be the most effective manner of eliciting informed input. Perhaps a public advisor office, such as being considered in California, to assure continuing dialogue on emerging energy issues would be a successful technique. The continuity of such an office would remove much of the confusion and suspicion derived from intensive issue-oriented educational campaigns. Moreover, this office would serve to strengthen the creditability of utility and government officials by demonstratively encouraging public involvement in both long- and short-term energy planning.

In a time of severe resource constraint, it is regrettable when investigation of important alternatives to assist in the mitigation of inherent situational conflicts is retarded by cries for unilateral actions. In Pennsylvania, while researchers were expressing cautious optimism about the potential social gains available with this siting alternative, citizen reactions precipitated in the hearings have slowed further investigations. While political leaders

*A recent Minnesota siting study is relevant to this point. In this case, public input was solicited in the specification and application of siting criteria.

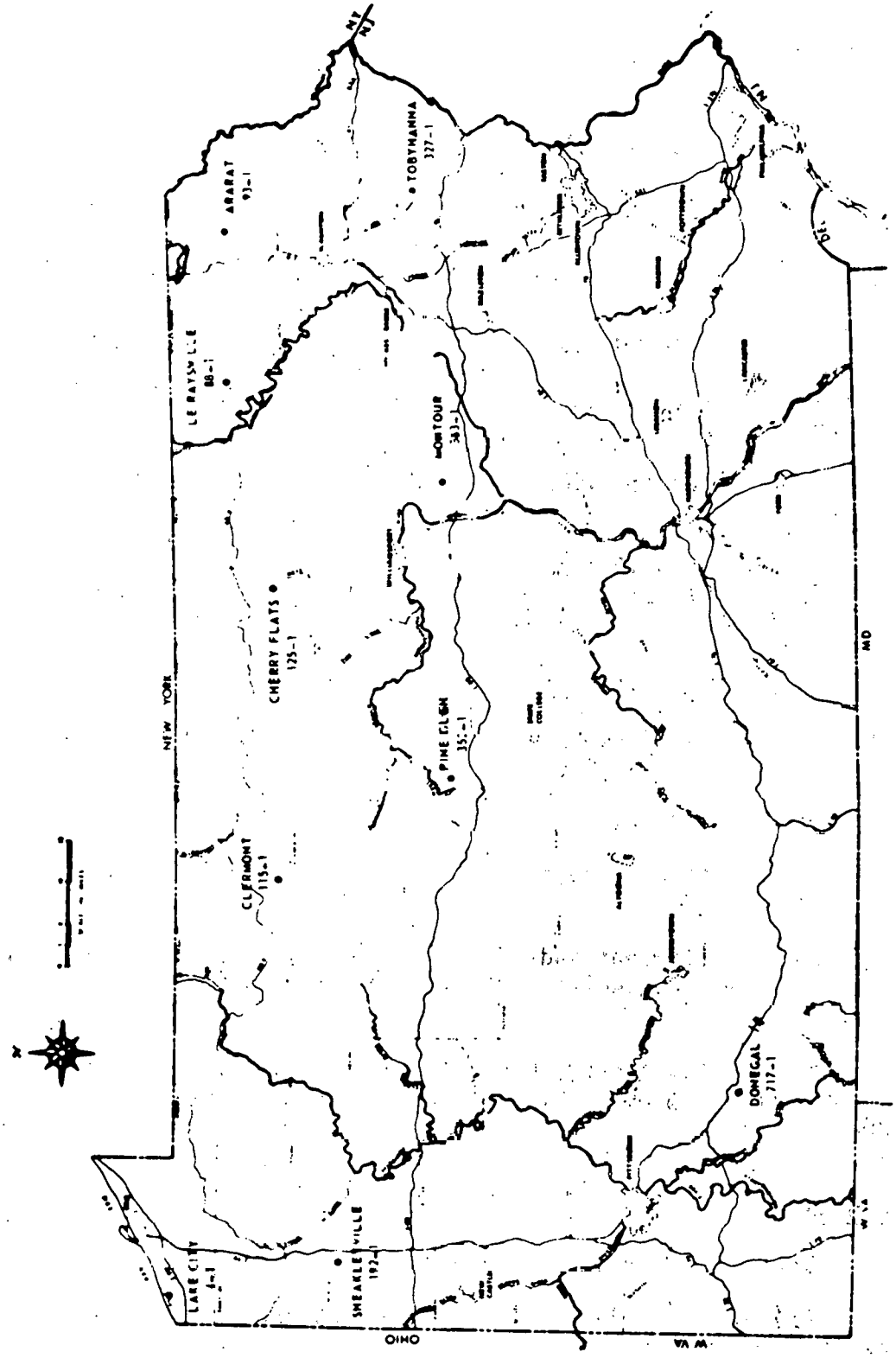
and scientists agree with Dr. Albert Einstein's assertion, "Our representatives depend ultimately on decisions made in the village square . . . . From there must come America's voice.", this Pennsylvania experience suggests renewed consideration of the methods by which this village voice is obtained.

APPENDIX A

TIMETABLE OF ENERGY PARK EXPERIENCE IN PENNSYLVANIA

Date	Event
June 1973	Four utilities initiate study of the concept.
March 1974	First report on concept submitted to utility managers by system planners and decision made to form Energy Park Development Group (EPDG).
November 1974	Gilbert Associates complete Site Identification Study for EPDG Task Force.
January 17, 1975	EPDG presentation of concept to Governor's Energy Council (GEC).
January 30, 1975	First public information hearing (Harrisburg).
May 1975 to December 1975	Public information and input meetings held in ten candidate counties.
January 23, 1976	GEC votes to suspend study of concept and refer general problem of siting to the legislature.
January 23, 1976	EPDG suspends operation.

APPENDIX B


NY
PA
ARARAT
93-1
TOBYHANNA
327-1
LE RAYSVILLE
88-1
MONTOUR
343-1
CHERRY FLATS
125-1
PINE GLEN
35-1
CLERMONT
115-1
NEW YORK
MD
DONEGAL
717-1
SHEAKLEYVILLE
192-1
OHIO
W VA

APPENDIX C

FACT SHEET

ENERGY PARK DEVELOPMENT

The Energy Park Concept

Definition: Concentration of electric generating capacity in a relatively small geographic area.

Range of capacity: 10,000 to 20,000 megawatts by the year 2000.

Fuel source: 50 percent fossil fuel (coal and possibly oil), 50 percent nuclear.

Estimated start-up date: 1985 for fossil fuel plants, 1987 for nuclear.

Plant capacity: 800 - 1200 megawatts per unit for initial installations. 2000 - 2500 megawatts per unit for later construction.

Pennsylvania Electric Power Outlook

Projected annual growth rate: 3.5 to 7.5 percent through the year 2000.

Operating projection: 5.9 percent annually.

Total capacity required: 86,650 megawatts by year 2000 at 5.9 percent rate.

Present planning: Current and/or planned capacity through 1983 would provide 34,835 megawatts or only about 40 percent of projected capacity.

Energy Park capacity: Energy parks could provide up to 50 percent of the remaining new capacity needed between 1984 and the year 2000.

Public Benefits

.Effective, coordinated land use.

.Minimize costly individual site licensing and permit requirements.

.Avoid duplication of effort.

.Labor force stability.

.Efficient utilization of support services.

.Match capacity to load requirements.

.Enhanced ability to raise investment capital through shared risk.

.Estimated 30 percent increase in productivity through permanent work forces, more consistent planning and on-site engineering.

Challenges Posed

.Need for public support.

.Proper site selection and acquisition.

.Environmental safeguards.

.Initial financial requirements.

Siting

Locations: 10 sites and 52 additional locations initially acceptable.

Considerations: Topography, air basins, rail and road access, waste disposal and community planning.

Population density: Those with more than 400 persons per square mile or within 5 miles of a population center of 25,000 people or more screened out.

Selection: Technical evaluations with public participation coordinated by the Governor's Energy Council.

Transmission

Based on line lengths between 300 and 350 miles.

Voltage levels	Construction cost	Right of Way Required	Tower Configuration	Power Losses in Transmission
500 kV	$ 1.02 Billion	24,400 acres	ht. 140 feet wd. 116 feet	498 MW
765 kV	1.17 "	41,300 "	ht. 130 feet wd. 140 feet	369 "
1300 kV	1.21 "	42,700 "	ht. 190 feet wd. 190 feet	138 "
± 600 kV DC	1.12 "	15,800 "	ht. 140 feet wd. 80 feet	354 "

Environmental Concerns

Air quality: Sulfur dioxide control through regenerative or closed loop system.

Water quality: Available lakes, rivers and streams with specially constructed on-site ponds to hold water and treat effluents.

Heat dissipation: Use of available technology for cooling systems including water sink and wet-dry cooling towers.

Weather effects: Meterological effects resulting from heat dissipation must be studied carefully and minimized by site selection and facility arrangement.

APPENDIX D

COMMONWEALTH OF PENNSYLVANIA
GOVERNOR'S OFFICE
ENERGY COUNCIL
P. O. Box 1323
Harrisburg, Pa. 17120
(717) 787-9749

IMMEDIATE USE
January 23, 1976

Contact: William B. Harral
717-787-9749

The Governor's Energy Council Chaired by Lt. Governor Ernest P. Kline, voted unanimously today to suspend the study of the energy park concept until larger issues which are central to the study of the concept can be resolved.

These issues, which the Council feels must be confronted are:

The impact of proposed amendments to the Federal Clean Air Act which could severely limit the further development of coal fired generating plants;

Land-use planning as it affects the issue of siting energy facilities;

Federal proposals and facility siting, particularly the nuclear energy site survey being conducted by the Nuclear Regulatory Commission;

The issue of local incentives primarily in utility taxation field, and

The broad issues of concentrated siting of nuclear power plants.

The Council also voted to present a resolution to the Legislature of the Commonwealth asking that the Joint State Government Commission, the research and planning arm of the Legislature, be directed to undertake a large-scale and concentrated study on the issue of energy facility siting with recommendations on state legislation needed to implement state government's role in siting procedures.

It is contemplated that the Joint State Government Commission would form a task force of advisors on the subject including representation from the Executive Branch, Federal and Local Government, energy producers, suppliers and consumers.

A copy of the Governor's Energy Council statement on the energy park concept is attached.

REFERENCES

Energy Parks and the Commonwealth of Pennsylvania (two volumes), Center for the Study of Environmental Policy, The Pennsylvania State University, August 1975.

"Energy Parks in Pennsylvania," Energy Park Development Group, January 1975.

Site Identification Study, Gilbert Associates, November 1, 1974.

"The Public Utilities Realty Tax," Pennsylvania Environmental Council, July 1976.

ENERGY CENTERS IN WASHINGTON STATE: A SOCIOECONOMIC INSTITUTIONS SUMMARY

Fred Clagett

Washington State Office of Community Development

Olympia, Washington

A. Introduction

The northwest states of Washington, Oregon, and Idaho are relatively short of fossil fuel resources but relatively blessed by hydroelectric energy resources particularly on the Columbia and Snake Rivers. Washington does have coal deposits but most have not been considered suitable for electric power generation. About 55% of the region's generating capacity is in federal hydroelectric facilities owned and operated by the U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers. The Bonneville Power Administration (BPA) was created to provide transmission facilities primarily for delivering federally generated power to utility distribution systems and to direct service customers; in that context BPA has been the federal marketing agency for Bureau of Reclamation and Corps of Engineers power.

From that simple origin, growth in the region has required the development of a much more complex interrelationship between the federal generation/transmission system and the public and private utilities of the region.

For electric power purposes the "region" is better described as the drainage basin of the Columbia River and its tributaries together with the western slope drainage of the Cascade Mountains. This geographic definition of the region also roughly describes the service area of the Bonneville Power Administration. The interrelationship of the river drainage system and the electric energy transmission system is a natural consequence of heavy regional dependence upon hydro generation --- about

85% including all federal, public, and private utility generation ("public" referring to publicly owned and "private" referring to investor owned utilities). Operation of any single reservoir and generation plant affects all the downstream plants which places a heavy premium upon operating coordination. Actually the federal dams and the BPA transmission grid are operated as a unit commonly referred to as the Federal Columbia River Power System (FCRPS).

The existence of the FCRPS system makes it theoretically possible to connect generation anywhere on the system for delivery anywhere else in the region. This characteristic introduces an element of thermal plant siting flexibility since the system design had to reflect the fact that suitable hydroelectric sites generally bear no relationship to load center needs. The BPA transmission grid is therefore used by individual northwest utilities to wheel power from a utility generation site to the utility's load center needs under a system of wheeling or energy transportation charges.

The close integration of all utilities into this regional system reduces land requirements for transmission corridors, reduces costs of transmission, and adds reliability to the individual systems in the region. Specifically in terms of socioeconomic impacts the system readily permits location of generation facilities in very rural, even isolated, locations in a region of relatively widely dispersed urban centers.

During the decade of the 1960's it was becoming apparent that all

major hydroelectric sites were either under development or were being withdrawn from consideration on account of other competing uses such as environmental preservation. Traditional demand projections suggested not only that hydroelectric sites were being exhausted but also the available water for firm power was being exhausted.

As an outgrowth of that recognition the informal Joint Power Planning Council of 104 public and private utilities in 1969 agreed upon the Hydro-Thermal Program for building new thermal plants for meeting future firm power requirements, while increasing the use of the river system for peaking requirements. The agreement further envisioned construction of large thermal plants each of which would serve the needs of more than one utility in order to reduce the number of plants, and therefore plant sites required, and to use economies of scale to hold down the costs of new power supplies.

The shortage of coal and oil resources in the three northwest states coupled with years of experience with nuclear reactors at the federal Hanford site near Richland, Washington and at the nuclear propulsion development center near Idaho Falls, Idaho led to early consideration of nuclear fuel as an energy source for new thermal plants. The initial step was taken by the 1966 start up of the 860 megawatt plant built at the Hanford site by the Washington Public Power Supply System to use waste heat from the federal N Reactor. However, the utilities continued to focus attention on sites on the west side of the Cascade Mountains (even farther from coal supplies in Montana and Wyoming) because the

existing configuration of hydroelectric development placed approximately 75% of the generation capacity east of the mountains with about 75% of the load west of the mountains. A utility objective, therefore, was to locate new thermal plants to provide better balance of load and resource locations while minimizing transmission requirements.

The Eugene Water and Electric Board proposed a thermal plant near its load center in western Oregon but the city's voters did not approve bonds for construction. More recently the Oregon state siting council has taken a position generally opposing nuclear plants in the western (urbanized) part of the state. The utilities are, therefore, being deterred from placing further new resources near exisiting major load centers.

It is into this framework that a possible energy center at Hanford has evolved and a center at Roosevelt, Washington has been proposed. Both are on the Columbia River in eastern Washington, and both could tie readily to the BPA transmission grid for delivery of power where needed.

The Hanford site is near urbanized areas which have suffered from boom type growth. The Roosevelt site is in a rural relatively isolated location. While development at Hanford is well along with one plant operating and three under construction, development at Roosevelt is still just a proposal subject to further evaluation. The urban communities near Harford are already struggling with the socioeconomic impacts of construction, while major advance planning is needed to prepare for the socioeconomic impacts that would occur from major development at Roosevelt.

In conjunction with preparation of this paper a comprehensive bibliography of socioeconomic reports bearing a relationship to energy centers in Washington State was assembled by and is available from the author. The complete bibliography was lengthy and not suited to the purposes of this report, although intended to be useful to the practitioner who wishes to penetrate this subject area more deeply. A portion of the bibliography is included here for direct reference.

B. Energy Resource Planning in the Northwest

Among the three northwest states generation capacity is distributed about 70% in Washington with 53% of the population, 22% in Oregon with 35% of the population, and 8% in Idaho with 12% of the population. This estimate reflects a 50-50 allocation of the federal hydro generation on the Columbia River boundary between Washington and Oregon.

These figures, however, may be misleading. Along the Oregon-Washington Columbia River boundary the turbine generator facilities at each of the dams are actually located on the Oregon side of the mid-stream line. Assigning all of that capacity to Oregon produces recent annual net generation figures of 57% for Washington, 35% for Oregon, and 8% for Idaho. This difference in method of reporting simply illustrates the Northwest difficulty of treating electric energy on a single state rather than a regional basis. Furthermore, the question of net import or net export of energy into or out of a state may be heavily dependent upon definition of terms particularly when a facility in one state is operated

in coordination with one in another state. This section, therefore, examines the regional utility relationships within which an energy center in Washington State would be operated.

In addition to the coordinated operation of the Federal Columbia River Power System as noted above, the utilities of the western U.S. and western Canada are associated at several levels, both voluntary and formal, to promote reliable operation through coordination of planning and operation of interconnected systems. Prior to World War II few intertie transmission facilities existed. Interconnection and coordinated planning were initiated during the war under urging by the Federal War Production Board to accelerate construction of generation and transmission facilities, and to interconnect systems to improve capacity, diversity, and reliability. Parallel with load growth those interrelationships have become more and more highly developed for responding to changing loads and resources on a regional, rather than an individual utility, basis. The inter-utility associations are briefly described here to identify the utility structures developed for energy resource planning. The governmental structures functioning in this area are summarized in another section.

1. Western Systems Coordinating Council.

The Western Systems Coordinating Council is the regional reliability council for the 13 contiguous western states and British Columbia. The states include Washington, Oregon, California, Arizona, New Mexico, Nevada, Colorado, Utah, Idaho, and portions of Wyoming, Montana, South

Dakota, and Nebraska. Membership is voluntary and includes 43 full members (bulk power systems with generation and transmission facilities), and 14 affiliate members. The full members include 19 investor-owned utilities, 11 public power systems, 8 municipal systems, 3 governmental agencies, and 2 Canadian systems. The affiliate members include 9 municipal systems, 4 cooperatives, and one public utility district. This membership makeup illustrates the diversity of utility types participating in the planning and coordination effort. While membership is voluntary the members are parties to the Western Systems Coordinating Council Agreement which provides that each member will keep the others informed of plans for system changes which would affect overall reliability.

2. Northwest Power Pool (NWPP).

The Northwest Power Pool in effect is a sub-region of the Western Systems Coordinating Council. Its members are generating utilities serving loads in the three Northwest states, and Montana, Wyoming, Utah, northern California, and British Columbia. The NWPP is subdivided into three groups: (a) the Canadian Group consisting of the British Columbia Hydro & Power Authority and West Kootenay Power & Light Company; (b) the East Group consisting of Idaho Power Company, Montana Power Company, and Utah Power & Light Company; and (c) the West Group made up of 4 private companies, 4 utility districts, 3 municipal systems, and 3 federal agencies.

The West Group of the Northwest Power Pool serves Washington, Oregon, northern Idaho, Montana west of the Continental Divide, and a portion of northern California. The West Group service area is therefore comparable

to the river drainage "region" described above and to the service area of the Bonneville Power Administration.

3. Pacific Northwest Utilities Conference Committee (PNUCC).

The Pacific Northwest Utilities Conference Committee coordinates the planning for the West Group Area of the Northwest Power Pool. It established a Loads and Resources Subcommittee which annually prepares an 11-year loads and resources forecast. The 11-year forecast is intended to provide adequate lead time for planning and installation of anticipated required new generation facilities. It also publishes annually a long range (20 year) projection of power loads and resources for thermal planning which is referred to in the bibliography as the "Blue Book".

4. Pacific Northwest Coordination Agreement.

The Pacific Northwest Coordination Agreement is a formal agreement signed by the generating utilities on the river system. Its purpose is to implement plans for coordination of reservoir storage-water releases during draw-down periods, for sharing the costs of upstream storage reservoirs, and for sharing forced outage reserves including coordinated scheduling of maintenance outages. By July each year a firm operating plan is adopted to limit disposition of energy capability of each utility to assure that resources are adequate to meet load during a critical water period. The agreement provides for mandatory interchange of capacity and energy under specified conditions. A significant product of the agreement is conservation of non-firm energy by coordinated use of reservoir storage. The agreement goes as far as to allow one utility to store energy in another utility's reservoir when water conditions

permit. Provision for meeting such a need improves the efficiency of the whole system.

5. Columbia Storage Power Exchange (CSPE).

The Columbia Storage Power Exchange is a non-profit no-stock corporation organized by 41 West Group Area utilities to market Canadian entitlement power which Canada offered to sell to a single entity in the United States. In 1961 the United States and Canada signed a treaty for cooperative development of the water resources of the Columbia River Basin. Since no single Northwest utility had the ability to finance purchase of Canadian entitlement power, implementation of the treaty was carried out by Columbia Storage Power Exchange purchase of the Canadian share of the treaty power for 30 years (to the year 2003). Canada used the proceeds of the sale to build three storage reservoirs on the Columbia River and its tributaries in British Columbia. Those reservoirs add flood control to the river basin, and the controlled release of stored water increases the usable energy and dependable capacity of U.S. hydroelectric projects downstream on the Columbia. The treaty provides that each nation is entitled to half of the added benefits created by this operating arrangement.

CSPE resold the Canadian entitlement power to the individual utilities. Depending upon the current needs of each utility, most of this power was resold in California on a temporary pull-back basis. As Northwest demands increase, those resources are being pulled back from California.

6. Washington Public Power Supply System (WPPSS).

Like Columbia Storage Power Exchange, the Washington Public Power Supply System is a corporation organized in 1957 by 21 member utilities. The members are all Washington State public utilities which joined under Chapter 43.52 of the Revised Code of Washington to form a joint operating agency which is a municipal corporation. It is not itself a utility. Specifically under RCW 43.52.360 and 43.52.391 WPPSS is authorized to construct and operate generation and transmission facilities, but is not authorized to acquire nor operate distribution facilities. It is the agency which built and operates the 860 megawatt N Plant at the Hanford site, and is currently constructing at the Hanford site WPPSS Nuclear Projects WNP-1, WNP-2, and WNP-4 as authorized under Chapter 54.44 RCW.

There are 29 municipalities, 28 utility districts, and 47 cooperatives which are participants in the WNP-1 and WNP-4 project, and have contracted to purchase approximately two thirds of the output. The other third is contracted for purchase by 5 private utilities. All purchasers are part of the West Group, and they are not limited to Washington State service areas.

7. Hydro-Thermal Program.

As noted above, in the decade of the 1960's it was becoming increasingly apparent that thermal energy was going to have to be added to the hydro-electric base of the West Group Area. The WPPSS N Plant was started in 1964 and began operation in 1966. The Joint Power Planning Council, composed of representatives of 104 private and public utilities, developed

the Hydro-Thermal Program for adding thermal generation through a coordinated approach which was adopted in 1969.

The coal-fired plant of two 700 MW units at Centralia, Washington was the first plant of the Hydro-Thermal Program. It was sponsored by Pacific Power & Light Co., which operates the plant, and Washington Water Power Co. However, in addition to four private utilities, ownership of the plant is shared by two municipal systems and two utility districts.

The second plant in the Program was the Trojan nuclear plant built by Portland General Electric Co. at Rainier, Oregon. That was followed by Colstrip units 1 and 2 in Montana from which 50% of the power is assigned to the West Group Area. Completion of Phase I of the Program was intended to assure a supply of electric energy through 1981. Beginning in 1973 the parties in the initial program began to plan Phase II for meeting West Group Area needs beyond 1981.

8. Pacific Northwest Generating Company (PNGC).

The Pacific Northwest Generating Company is a generating and transmission (G&T) coop organized in 1975 by 5 cooperatives in Washington, 6 in Oregon, and 3 in Idaho. The coops are organized under the federal Rural Electrification Administration statutes.

Pacific Northwest Generating Company owns a 10% interest in the 500 MW Carty Coal Plant which is under construction at Boardman in eastern Oregon. It will receive a 10% share of the power output which will be allocated to the coop owners of PNGC.

The Carty Coal Plant is one of the plants proposed by Phase II of the Hydro-Thermal Program. It is being built by the Portland General Electric Company which will own 80% with Idaho Power Company holding the other 10%.

* * *

Energy resource planning affects and is affected by land use planning and regulation - or the lack thereof. General state policies, adopted by legislative processes, can provide guidelines affecting future energy demand and guidelines to assist in planning for future energy needs. In the absence of such guides the energy suppliers must base decisions on trend-type projections since they are required to meet demands whatever those demands may be.

In the State of Washington "widest possible use" of electrical energy was incorporated into legislation as state policy. The concept of "widest possible use" of electrical energy emerged with development of the hydro-electric resources of the Columbia River and its tributaries. The river system belongs to the public and therefore, it was reasoned, the power benefits from the river system should be available to everyone. It was a relatively energy-starved state at the time the hydro system was planned: no petroleum resources in the Northwest, no natural gas service available at that time, limited availability of good coal supplies, and a shortage of long-distance transmission facilities for a dispersed population. It therefore became a matter of public policy to make the public benefits of the river system as fairly as possible available to everyone. This concept was later incorporated as the "public preference" clause in the federal Bonneville Project Act which was passed into law in 1937.

Currently two major energy resource planning studies are underway in the Northwest. One is a role environmental impact statement being prepared by the Bonneville Power Administration: The Role of BPA in the Pacific Northwest Power Supply System, Including Its Participation in the Hydro-Thermal Program. The second is the Northwest Energy Policy Project which is a study funded by the Pacific Northwest Regional Commission as a companion or parallel study to the BPA role EIS preparation. A major goal of the Northwest Energy Policy Project is to identify and analyze the policy options available to the Pacific Northwest states to influence future patterns of energy production and consumption in the region.

Another study, recently completed, was commissioned by the Pacific Northwest Utilities Conference Committee to develop a model for load forecasting for the West Group Area. The work was performed by National Economics Research Associates (NERA) which developed an econometric model for each of the states of Washington, Oregon, Idaho, and Montana. The consolidated model is not being used to provide the West Group Forecast, but rather is being used as a testing model for forecasts beginning with 1974 as base year.

In the Pacific Northwest -- as in other western regions -- land use, energy demand and availability, and water use are closely interlocked. Yet public decision making in one of these subject areas frequently has not comprehensively considered the others. A case in point is the fact that a 1976 final environmental statement by the U.S. Bureau of Reclamation on expansion of the Columbia Basin Project does not squarely address the issue of increase of regional thermal generation as a direct consequence of using water in conjunction with a change in land use. The

expansion of irrigated agriculture in eastern Washington, eastern Oregon, and southern Idaho will increase requirements for thermal generation to meet regional needs because of lost hydroelectric potential and added irrigation pumping load. This is one of the interstate issues in electric energy resource planning.

C. Regional (Interstate) Issues

The export of electric power has been a sensitive issue in Washington State. The reasons for this probably relate to the high visibility of penalties such as reduction of fish runs in the rivers while less evident are the benefits against which tradeoffs may be judged.

The transmission intertie with California has been the subject of some controversy. Southern California has a summer peak when petroleum fueled generation plants may also be faced with pollution control constraints. River flow in the Northwest is high in summer but low in winter when the Northwest peak occurs. Lack of public understanding of benefits from power exchange under these circumstances may reflect the lack of a governmental forum for regional policy development on such issues.

The rate spread between private utilities in Oregon and public utilities in Washington has been increasing as the private utilities have had to turn sooner to thermal generation. This divergence produces service area rate differences which may or may not be desirable for the overall public interest. The issue then arises as to how can a public policy position be developed in the absence of an interstate governmental forum. The individual utility cannot resolve the policy question nor can a state utilities commission. The Bonneville Power Administration provided a discussion vehicle for considering policy alternatives on this question (among others) through issuance of its REGIONAL POWER PLANNING - STUDY PAPER in November 1976, but without availability of a governmental mechanism for policy development. Currently the available decision process is for the utilities to seek to agree among themselves.

Priorities for competing consumptive uses of water from a regional river system are not a subject for which interstate public policy processes are clearly identifiable. This issue has arisen on the Colorado River, and on the Columbia-Snake River system. Competing uses include thermal generation cooling water, hydroelectric generation, irrigation, migratory fish, and bulk transportation. Recently Washington has been developing irrigated agriculture at the rate of 25,000 acres per year and Idaho at the rate of 50,000 acres per year. The interaction of such competing uses will ultimately be a factor in policy questions on development of energy centers at Hanford and/or Roosevelt.

The Washington-Oregon boundary sharply focuses the question of interstate governmental decision processes as contrasted with utility decisions across interstate lines. The Columbia River boundary is both an energy and transportation corridor. The river is itself a transportation artery and a source of hydro power, and it is rimmed on both sides by rail lines, highways, and transmission lines. Geographically it is sufficiently hemmed in that the valley constitutes a single airshed for development which may occur on either side of the river.

Energy resources developed and proposed along this stretch of the river include the Trojan nuclear plant in Oregon, Bonneville Dam, The Dalles Dam, John Day Dam, the proposed Roosevelt nuclear and/or coal center in Washington, the proposed Pebble Springs nuclear plants across the river in Oregon, Carty Coal Plant under construction at Boardman in Oregon, and McNary Dam. And 45 miles from Boardman is the Hanford site which is on the Columbia River in Washington but not on the boundary.

The Roosevelt and Pebble Springs sites are just a couple of miles apart while the Carty Coal Plant is about 27 miles upriver. An obvious immediate question is whether the available pollution capacity of the airshed is taken up on one side of the river or the other on a first come first served basis. Would construction of multiple coal fired units at Roosevelt, Washington prevent construction of a proposed aluminum plant at Boardman, Oregon? Or vice versa? What governmental issues would be raised requiring tax supported response if an energy center were built on one side of the river boundary with most of the construction workers and families living on the other side?

These are not insurmountable problems, but they may provide knotty hurdles to get over without suitable advance planning nor adequate interstate governmental policy mechanisms. Energy center development may accentuate the need for an interstate governmental policy planning process.

D. Regional Governmental Organization

For the purposes of this section, "governmental" focuses on regional structures of government which are more related to legislative action than to regulatory control, to policy rather than proprietary functions, to tax supported rather than rate supported activities. These structures may therefore have objectives different from the utility organizations described in Section B above (which are directed at provision of electric utility services). The interaction of governmental and utility structures is briefly considered in the context of institutional policy development relative to energy centers in Washington State.

1. Columbia River Treaty

The Columbia River is subject to heavy flooding from spring precipitation combined with melting of the winter snowpack from the eastern slope of the Cascade Mountains to the western slope of the Rockies. Flood control of the Columbia River system has been one of the purposes of damming the river to achieve two objectives: to reduce recurring flood damage and, probably even more importantly, to capture the power generation potential otherwise lost over dam spillways during heavy spring runoff. To contain and regulate the spring runoff requires coordinated storage in both the Canadian and U.S. portions of the river system.

The International Joint Commission (IJC) was established by the United States and Canada through the Boundary Waters Treaty of 1909. The two governments in 1944 asked the Commission to examine coordinated

use of the Columbia River system. U.S. impetus to reaching an agreement was given by the 1955 action of the Canadian Parliament to study diversion of the upper Columbia to the Fraser River. A treaty for coordinated development of the river was signed by the two governments and confirmed by the U.S. Senate in 1961. Confirmation was given by the Canadian Parliament in 1964.

The two principal U.S. benefits from the treaty are flood control and power storage. Establishment of the treaty agreement provided the basis for completing development of the hydro-electric potential of the Columbia River system and for integrating future thermal generation with the hydro system under the Hydro-Thermal Program. In the future it is anticipated that maximum efficiency will be achieved by using thermal generation for base load and the river system for peaking, supplemental resources, and reserves. This is a factor in the feasibility of regional energy center development in the Pacific Northwest.

2. The Western Interstate Nuclear Board (WINB)

In 1966, the governors of thirteen western states initiated the formation of an interstate compact to enhance state capability to deal with proposed nuclear developments. That was the same year the WPPSS N plant went on the line at Hanford. The compact was proposed in 1967 and adopted by all eleven state legislatures by 1969 (cf. Revised Code of Washington 43.31.400 passed in 1969). In October 1970 the U.S. Congress passed legislation (Public Law 91-461) recognizing the compact and directing federal agency cooperation.

The states which are party to the compact "recognize that optimum benefit from nuclear and related scientific or technological resources, facilities, and skills requires systematic encouragement, guidance, assistance and promotion from the party states on a cooperative basis. It is the policy of the states to undertake such cooperation on a continuing basis. It is the purpose of this compact to provide the instruments and framework for such a cooperative effort in nuclear and related fields, to enhance the economy of the West and contribute to the individual and community well-being of the region's people."

WINB, with funding by the member states, has published and is conducting several studies related to the development of energy centers. These include analysis of electricity supply-demand, energy resource development, energy centers, and regional factors in planning and siting energy facilities.

3. Western Governors' Regional Energy Policy Office (WGREPO)

This office is in effect a regional subsidiary of the National Governors' Conference. It does not cover exactly the same states as the Western Interstate Nuclear Board. However, since there is some overlap of functions and objectives, consideration is being given to consolidating WGREPO and WINB.

The western governors in 1976 agreed to the following objectives in the energy field:

(1) To work toward early consolidation of existing organizations into a single regional energy agency covering essentially the same geographic area as the Western Systems Coordinating Council of the utilities;

(2) To transfer the functions of the Western Governors' Regional Energy Policy Office to the new energy agency;

(3) To review the Western Interstate Nuclear Compact to determine if new legal provisions are needed to facilitate long-term interstate and federal-state cooperation; and

(4) To continue the same or revised functions and funding of the Western Interstate Nuclear Compact and the Western Interstate Nuclear Board under the auspices of the new regional energy agency (which would require ratification by the state legislatures and the U.S. Congress).

4. Pacific Northwest River Basins Commission (PNRBC)

In 1946 the Columbia Basin Inter-Agency Committee was formed by six federal agencies with the governors of seven states (Washington, Oregon, Idaho, Montana, Wyoming, Utah and Nevada) invited to participate in facilitating coordination of water resources policies and programs. This federal committee created a Power Planning Subcommittee in 1954 to study long-range regional load requirements, the part to be played by federal hydro projects, and planning for the best way to coordinate operation of the power systems in the Pacific Northwest. The first power planning report was issued in 1960.

The Pacific Northwest River Basins Commission was established in 1967 under terms of the federal Water Resources Planning Act of 1965 (Public Law 89-80). Organization was at the request of the governors of Washington, Oregon, Idaho, Montana and Wyoming, and the Commission took over the functions of the federal Columbia Basin Inter-Agency Committee with more

balanced state/federal participation.

Under the federal statute the functions of the PNRBC are to (1) serve as principal agency for coordinating federal, state, interstate, local and non-governmental plans for development of water and related land resources; (2) prepare a comprehensive, coordinated, joint plan for development of water and related land resources; (3) recommend long-range schedules including priorities for data collection and analysis, and plan for proposed project construction; and (4) undertake such studies of water and related resources as needed for preparation of plans. The PNRBC continued the function of the Power Planning Committee which had been established by the Columbia Basin Inter-Agency Committee and has continued the annual publication of a power planning report. The PNRBC is probably best described as a state and federally financed organization for comprehensive studying and reporting more than for actual interstate policy development with respect to river basin water and related land resources. It is only peripherally involved with the development of energy center issues from the general aspect of future energy resource needs and the proposed use of water by such a center.

5. Pacific Northwest Regional Commission

The Pacific Northwest Regional Commission is a federally funded agency consisting of the governors of the states of Idaho, Oregon and Washington with a member representing the federal government. The Commission supports planning studies for the resolution of regional interstate problems. A current major goal of the Commission is the Northwest Energy Policy Project to identify and analyze policy options available to the states to influence

future energy production and consumption. The Project is comprehensive in its analysis of the whole field of energy within the framework of the Project goal, but it does not specifically address the application of energy centers to future energy needs. It does, however, address issues of energy policy analysis and integrating models.

6. Columbia Interstate Compact Commission

In 1951 a state Interstate Compact Commission was created by the Washington State Legislature (Chapter 43.57 Revised Code of Washington). The Legislature authorized a five member commission (two senators, two representatives and a chairman appointed by the governor) to represent the State of Washington on a joint commission to be composed of representatives of the states of Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming together with federal representatives. By the Washington statute the joint commission "shall be organized for the purpose of considering, negotiating, and entering into an agreement or compact between not less than five of said states, with the consent of the Congress of the United States, respecting the division, apportionment, and use of the waters of the Columbia River and its tributaries and the determination of rights in connection therewith and incidental thereto."

The statute was amended in 1953 and authorized the state commission to serve from June 11, 1953 until an agreement or compact binding on the State of Washington has been entered into with the other states. The statute is still on the books and no agreement has yet been reached; therefore the state commission is technically still in existence.

In 1952 the U.S. Congress authorized the Columbia Interstate Compact

Commission. The Washington Interstate Compact Commission participated with the other states in drafting a proposed compact which in 1962 was submitted to the states for ratification. The five upstream states adopted the compact, but Washington and Oregon failed to give it approval. The compact was therefore not put in effect by Congress, and the issue has been dormant since about 1965.

In 1975 efforts were made to revive the Columbia Interstate Compact Commission. The Legislature routinely amended the Washington statute, the President appointed a new federal representative as chairman, and the Pacific Northwest River Basins Commission provided updated studies on which compact negotiations could be based. The issue appeared to be to put the federal statute to use, or to wipe it off the books and look for other alternatives.

Furthermore, the U.S. Congress in 1968 required a 10-year moratorium on any federal agency study of water diversion from the Columbia River system thereby giving the states 10 years to reach agreement. That action tends to set a 1978 deadline for interstate/federal cooperative action after 25 years of compact authorization by Congress. But the last meeting of representatives of the compact states was in January 1976 with no vigorous compact development program established.

The compact states generally cover the area of the utilities' Northwest Power Pool, and a compact could provide a mechanism for governmental policy interaction with the utilities on a regional planning basis. While water allocation was the original motivation and primary driving force for compact consideration, it was generally recognized that hydroelectric generation is an interstate issue affecting and affected by allocation of water

for reclamation, fish migration, and other in-stream uses such as transportation. With the implementation of the Hydro-Thermal Program among the utilities, the interlock is now even closer between use of water for power -- hydro generation and cooling for thermal generation -- and for consumptive use like irrigation. A barrier to approval of the 1962 compact proposal was disagreement between the positions of public and private power interests particularly as those affected the positions of the several states.

The issue of Indian water rights may be another factor complicating, but also requiring, resolution of competing interests.

E. Electrical Energy Base of Washington State

The origin and regulation of electric utilities in Washington is diverse, and the licensing of generation within the state is subject to several different agencies depending upon the type of plant. All the types of utilities are involved one way or another in development of the possibilities of Hanford and Roosevelt as energy centers. "Center" in this case is used to identify the site as the location for multiple thermal units without fixed qualification as to the total number of units, and without specification whether other elements of the fuel cycle would be co-located at the same general site. Use of the term "center" relative to Hanford and Roosevelt is therefore very loose as compared with development of a more precise concept in the literature.

The Bureau of Reclamation and the Corps of Engineers have been involved in construction and operation of federal hydroelectric dams the power from which is marketed by the Bonneville Power Administration. Three major private utilities -- Puget Sound Power and Light Co., Washington Water Power Co., and Pacific Power and Light Co. which has proposed the center at Roosevelt -- have generation and distribution facilities in Washington as well as service areas in other states. There are 16 cooperatives in Washington organized under the federal Rural Electrification Administration.

Municipalities have been involved with the generation and distribution of electric power practically since the beginnings of the state. As general purpose governments to which the state has authorized both governmental and proprietary functions, cities may perform not only the usual functions of water supply, sewage and trash removal, but also gas distribution, rail belt line

service, TV cable, and power generation and distribution. These functions are under the regulatory control of the locally elected city councils including such issues as participation in energy center development for their power supplies. Including Seattle and Tacoma, 23 cities operate their own electrical systems.

For providing proprietary functions in unincorporated areas the Legislature has generally followed the practise of authorizing special purpose districts rather than assigning those functions to county governments. The public utility district (PUD) statute became law in 1931 following an initiative in 1930 "to permit counties or subdivisions of counties to vote on setting up public utility districts with power to develop and distribute water and/or power." The purpose of the act was stated to be "to conserve the water and power resources of the State of Washington for the benefit of the people thereof, and to supply public utility service including water and electricity for all uses."

A PUD may be county-wide including the cities or it may contain less than an entire county, but it may not extend beyond a single county. Like other special purpose districts, PUD's operate under the regulatory control of a locally elected board of commissioners, who are given (under RCW 54.04.120) the same powers as county commissioners in relation to city, town, county and regional planning. PUD's are operating electrical systems in 21 of 39 counties in the state.

While city and PUD electrical distribution systems are limited by statute in the area they may serve, the Legislature authorized cities and PUD's to form joint operating agencies for the purpose of providing generation

and transmission facilities. The Washington Public Power Supply System (WPPSS) is a joint operating agency (JOA) with the cities of Richland, Tacoma, Seattle and 18 PUD's as members. Project participants in construction of generation facilities may include other utilities than the JOA members. WPPSS is the builder and operator of the Hanford Generating Plant, and is currently building plants WNP-1, WNP-2 and WNP-4 at Hanford.

In summary, the private utilities are regulated by the State Utilities and Transportation Commission. The cities, public utility districts, and joint operating agencies are created under and subject to specific state statutes, they are consumer-owned under the operating control of locally elected officials, and they are subject to examination by the Office of State Auditor.

Shared ownership of thermal generation facilities is common in Washington and Oregon, although there is no announced plan for shared ownership of plants at Hanford or Roosevelt. The Centralia coal-fired plant, for example is owned by four private utilities, two cities and two public utility districts; management is vested in a single company sponsor.

Hydroelectric plants are licensed by the Federal Power Commission. Washington State legislation has presumed federal preemption of hydro facilities, and there is no provision for direct state involvement in their siting or licensing. Fossil fuel generating facilities are certified by the state Energy Facility Site Evaluation Council (EFSEC) with federal involvement limited to enforcement of federal pollution control standards. However, EFSEC is authorized to issue National Pollution Discharge Elimination System

permits for such facilities. Nuclear plants of course are licensed by both the state (EFSEC) and the federal Nuclear Regulatory Commission.

Pumped storage facilities for peak power generation are also subject to Federal Power Commission licensing and are not covered in Washington State statutes. The first pumped storage generating units in the Pacific Northwest were installed at Coulee Dam where the Bureau of Reclamation has a project for using reversible units for lifting water for irrigation and return flow for generation. The Corps of Engineers has an extensive pumped storage site study underway for the Pacific Northwest River Basins Commission. About eight primary sites are under study in Washington of which six are in the Columbia Basin area.

Energy is required for the pumped storage of energy for peaking or emergency use. The energy to support pumped storage is ordinarily taken from off-peak operation of base load thermal generation. Energy centers at Hanford and/or Roosevelt could be a source of thermal generation for pumped storage in eastern Washington. Sufficient thermal capacity, however, may not be available for another 10 or 15 years.

If pumped storage is to become a significant component of the Northwest energy system at other sites in addition to Coulee Dam, then the long range timing provides opportunity for local land use planning for the area to be impacted by the proposed site which is fixed by physical requirements. Coordination of utility and governmental planning may well be essential to the availability of sites.

F. Energy Facility Site Evaluation Council

The Washington energy facility siting statute was aimed at a "one stop" permit approach. Up until the statute was amended in 1976, however, it functioned in practice as a three or four stop process involving local, state, and federal agencies: (1) the applicant first sought local planning authority concurrence with the project proposal as necessary; (2) application was filed with the state energy facility siting agency which went through three separate hearing stages - the first to determine whether the application was in fact consistent with local plans and complied with local regulations, then a contested case hearing was held on the application for certification of the site; (3) a third hearing was held under separate guidelines on the granting of a National Pollution Discharge Elimination System (NPDES) permit; and (4) the federal Nuclear Regulatory Commission concurrently followed its own application, hearing, and licensing process. The second and third items above could be performed together, and the certification agreement and NPDES permit authorized and signed together with each dependent upon the other.

Four site applications for seven nuclear plants were certified under the above process. In 1976 the siting statute was amended with the result (among other changes) that legal opinion concluded the first step was no longer necessary, i.e. to require application as necessary to local planning authorities. The legal opinion was that the changes in the statute established "state preemption" with the result that compliance with local planning and regulation is not a prerequisite to filing a site application with the state, although the statute still requires an initial hearing to

examine the relationship of the project proposal to local planning and zoning.

Other examples of the "one stop" concept include the following specific elements. The state has adopted a building code which it requires the counties to enforce in unincorporated areas, but energy facility sponsors do not apply to counties for building permits even for auxiliary or temporary buildings. The site certification is presumed to grant such permits. Also a site applicant does not make a separate application for a water right; instead a site certification in presumed to grant a right for the water specified in the site application and defined in the certification agreement.

The statute authorizes the site evaluation council to take up to 12 months from receipt of application to make its recommendation to the governor, and another 2 months for the governor to act upon the council's recommendation - a total of 14 months without extension. For the four existing certifications these times were:

WNP-2 at Hanford	16 months
WNP-1 and 4 at Hanford	15 "
WNP-3 and 5 at Satsop	27 "
Puget 1 and 2 at Skagit	33 "

The above tabulation immediately suggests a difference between Hanford and the other two sites. There were a number of other factors, however, including the sequence of application and the site evaluation council's workload. Puget 1 and 2 application was filed in March 1974, WNP-1 and 4 in May 1974, and WNP-3 and 5 in July 1974. In 1975 the council held a total of 95 days of formal hearings and 24 regular meetings. This over-

lap of applications unquestionably contributed to lengthening the processing time.

The siting statute states (RCW 80.50.170 and 80.50.175) that it is the intent "to expedite the certification of sites for energy facilities subject to this chapter". To that end it prescribes minimizing duplication of environmental impact statements and encourages cooperation between the council and local governmental units. The statute, however, not only calls for "state preemption" of sites but fails to provide any mechanism for cooperative or coordinated decision making between local and state government.

In the same sections noted above the statute authorizes the council to conduct a preliminary study of any potential site prior to receipt of an application for site certification, but only at the request of a potential applicant. The primary functions of the council are to receive and investigate site applications, to establish criteria specific to the site and report to the governor, to prescribe the means for monitoring the effects of construction and operation, and to present Washington State concerns to other states and the federal government. The council therefore serves primarily as a regulatory body to respond to applications. It is given neither the authority nor the means to do advance planning on its own. It specifically does not pre-qualify sites, nor has it by rule excluded any areas from consideration by a potential applicant. This is in sharp contrast to the preemption of local planning and land use regulation, which are authorized for, and even in some circumstances required of, local government by the state.

The first socioeconomic guideline for applicants was adopted in May 1974, and was applied to all three applications received in 1974. It read simply as follows:

> WAC 463-12-155 ENVIRONMENTAL IMPACT -- SOCIAL AND ECONOMIC. The applicant shall provide a description of the primary and secondary impacts on the socioeconomic environment which reasonably may occur in the proposed power plant's area of influence and which are related to activities involved in plant construction and operation.

Following amendment of the siting statute in 1976, the council adopted new application guidelines including the following:

> WAC 463-42-620 CONTENT -- SOCIOECONOMIC IMPACT. At least 90 dayes prior to the final contested case hearing the applicant shall submit a detailed socioeconomic impact study which indentifies primary and secondary and positive as well as negative impacts on the socioeconomic environment with particular attention and analysis if impact on population, work forces, property values, housing, traffic, health and safety facilities and services, education facilities and services, and local economy. The applicant shall then describe the means utilized to minimize or mitigate possible adverse impacts.

The newer regulation contains more detail than the earlier guideline, but is not consistent with the human enviroment elements of the State Environmental Policy Act (SEPA) guidelines (WAC 197-10-444 and WAC 463-46-444). Correlation of these separate requirements would facilitate both preparation and procession of applications particularly in the context of an energy center of multiple units.

For WNP-1 and WNP-4 at Hanford the agreement of August 1975 provides:

1. The Supply System agrees to undertake a supplemental Socio-economic Impact Study beginning at the time of initial construction and to be completed within three years from the date of the execution of this agreement.

2. The Supply System agrees to evaluate, negotiate in good faith, and to honor those claims by counties, school districts and other taxing districts for compensation due to and increased financial burden where such claim is demonstrated to be caused by the construction of the project.

For WNP-3 and WNP-5 at Satsop the agreement of October 1976 provides:

1. Supply System agrees to monitor primary and secondary socioeconomic impacts of the project during construction and to report quarterly the results to the Council.

2. Supply System agrees to pay any valid claims filed against it by the state or by any agency or political subdivision of the state, including but not limited to counties, cities and school districts, arising out of an actually incurred or clearly anticipated net financial burden or deficiency substantially caused by primary or secondary socioeconomic or environmental impacts from construction or operation of the project. Any such net financial burden or deficiency shall be calculated by allowing as a credit or offset against the total financial burden of deficiency so caused any revenues to the claimant reasonably attributable to construction or operation of the project. With respect to any clearly anticipated net financial burden or deficiency, payment of such claim shall be made to the claimant no later than the time such burden or deficiency is actually incurred. The burden of establishing the validity of any such claim shall be upon the claimant.

For Puget 1 and 2 at Skagit the agreement of January 1977 provides:

1. Puget agrees to monitor primary and secondary socioeconomic impacts of the project during construction in close cooperation with Skagit County and other affected counties and governmental units, including but not limited to, Council member agencies, and to make information available, on a regular basis, to the Council relating to the project in the socioeconomic planning effort.

2. Specific data to be reported and a schedule for reporting socioeconomic effects of construction shall be determined following consultation between Puget, Skagit County and the Council no later than six months after the effective date of this Certification Agreement, subject to further modification as necessary.

3. Puget agrees to pay any valid claims filed against it by the state or by any agency or political subdivision of the state, including but not limited to counties, cities and school dis-

tricts, arising out of an actually incurred or clearly anticipated net financial burden or deficiency substantially caused by primary or secondary socioeconomic or environmental impacts from construction or operation of the project. Any such net financial burden or deficiency shall be calculated by allowing as a credit or offset against the total financial burden or deficiency so caused any revenues to the claimant reasonably attributable to construction or operation of the project. With respect to any clearly anticipated net financial burden or deficiency, payment of such claim shall be made to the claimant no later than the time such burden or deficiency is actually incurred. The burden of establishing the validity of any such claim shall be upon the claimant.

4. If needed, Puget agrees to make available for temporary housing any suitable land which it owns in the vicinity of the site, which is otherwise unused.

The agreement for Puget 1 and 2 at Skagit also contains the following language with respect to construction traffic:

1. Puget agrees to make planned improvements to portions of the public road system by providing left turn channelization at the intersection of Bacus Road and SR-20 and at the intersection of the new site access road and SR-20. Puget will work with the State and County to develop plans and methods to prevent traffic overloads on the existing public roadway network to the site. These shall include consideration of alternate routing where available, staggering of shifts to reduce traffic at peak hours, busing of personnel to the site or construction of additional lanes and channelization as may be required to provide adequate movement of traffic on the highways affected. The plans as adopted and implemented must provide such measures, including provision of financing by Puget, as the Council deems necessary, reasonable and appropriate. Particular attention shall be given to the period June 1 to September 15, inclusive.

2. Puget agrees to submit, at least six months prior to employment of an onsite construction force of 500 persons, specific traffic reduction plans, to the Council for timely review and comment. If the Council has objections to any of the particulars thereof, it shall respond with comments indicating reasons for its objections within thirty (30) days of receipt of such documents, unless Puget and Council by mutual agreement extend the time for response. In such cases, the Council may require Puget to make such changes, deletions or additions as are appropriate.

3. Traffic control to provide for pedestrian crossing of SR-20 in Sedro Woolley shall be installed by Puget as required by the increase in construction traffic, subject to approval of the Washington State Department of Highways.

The certification conditions are site specific and result from evidence presented and analyzed in the course of the contested case hearing on an application. They are therefore not precedent setting for another site. But these socioeconomic details of the existing agreements are reported here as an indication of the kinds of conditions that might be developed for additional plants at Hanford, and for energy center development at Roosevelt.

G. State/Local Relationships in Siting

One of the serious problems of dealing with the local impact of a major development like an energy center is the question of how to get adequate local government representation on the state siting council and/or before the council. The Washington State siting statute authorizes a county legislative body to appoint a member or designee to sit with the council "only at such times as the council considers the proposed site for the county which he represents". In practice this has been narrowly interpreted to mean the county member may participate and vote only on issues directly related to physical conditions in the county but not on socio-economic policy questions which would apply to the county site but would not necessarily be limited to that county.

No provision is made for representation of city or special district interests (except that when an application for a port facility is included in an application, an affected port district may appoint a non-voting member.) This condition is aggravated by the fact county government may be subject relatively to the least impact while receiving all of whatever direct local revenues are generated by the project; the cities, school districts, hospital districts, library districts, fire districts may receive relatively the most impact with little or no direct project generated revenues during construction.

Local planning for the impacts of growth is an essential key to mitigation of adverse effects and to minimizing per capita costs of governmental services. Experience with planning for nuclear sites in Washington State has been diverse.

In the case of the county where the Hanford site is located, testimony was given to the council to the effect that two thirds of the county had a zoning classification which would place no restriction upon a thermal power plant anywhere in that area.

The county in which the Satsop sit is located had, years before the site application, established a zoning classification which specifically permitted thermal power plants in certain rural areas. This was done at the request of the county public utility district which is a member of the Washington Public Power Supply System, now the site applicant.

In Skagit county the site of the proposed Puget Sound Power & Light Co. plants did not carry suitable comprehensive planning and zoning provisions to permit the proposed use of the site. A county comprehensive plan update with extensive public hearings, including other municipal units of government in addition the county, resulted in a local contract rezone agreement before the site application was filed with the state.

In the county where an energy center is proposed at Roosevelt, comprehensive planning and zoning permit only residential and agricultural use at the plant site. Rezone could be achieved either through agreement between the applicant and the county on a "Planned District" or through an "Intent to Rezone" process authorized by the county. Under the state preemption interpretation of the current statute, however, no application to the county would be required. The county and any other local units would have to appear as intervenors at the contested case hearing in order to present their cases with respect to mitigation of adverse socioeconomic impacts.

State preemption becomes "applicant preemption" of local planning and land use regulations under the conditions of the existing state statute. There is no provision for the siting council to perform the planning which could be done by local units of government. The council must respond to the specific proposal of the applicant without the option of directing consideration of alternatives.

Instead of total state preemption on the one extreme or local veto of a site on the other, there is at least one other kind of process which could be used to link local and state government in the siting decision. The applicant could be required to submit a copy of the site application to appropriate local officials at the same time the application is filed with the state. Impacted local units could proceed to work with the applicant on options, alternatives, or conditions relative to local impact at the same time the state siting council is taking its first steps to initiate processing. Local units could finally, by resolution of local legislative bodies, submit as findings of fact to the siting council whether the application (as submitted or amended) is consistent and in compliance with local planning and regulations. If found <u>not</u> consistent or in compliance, the resolution could declare in what particulars the proposal does not meet local requirements and what conditions, if any, would bring it into acceptable agreement. These "facts" determined by the impacted local units would then become part of the body of evidence acquired by the siting council in the course of its consideration of the application.

Such a process would provide opportunity for local units of government and the applicant to seek an accommodation which is prevented by state

preemption. The decision relative to consistency and compliance with local planning would be made by the local officials responsible for those plans and regulations. If there are statewide or national interests in the use of the particular site, this procedure would give the state siting council a basis for measuring the extent of state responsibility for mitigating local adverse impacts. The value of such a procedure would be accentuated under the extended impact created by development of an energy center such as Roosevelt.

The linking of local and state government in the siting decision process could be further improved in Washington by using a substate regional council of governments as the local agency which deals with the state on local siting issues. Such a procedure would provide a vehicle to assure that all potentially impacted local units have opportunity to be informed and to make input to the process. It would establish a single primary point of local contact for the state and for the applicant, and it would provide a local forum for development of policy positions on siting issues which are not restricted to a single local agency--particulary such elements as transportation and public transit, emergency services (fire, police, ambulance), communications, and taxes.

The need for a substate regional council of governments (COG) to deal with area-wide impacts from a specific energy center site is locally comparable to the need for a regional interstate structure of state governments for relating to interstate (river basin) utility organizations and for dealing with the federal government. Furthermore, such a substate regional COG could provide valuable service both to its member local govern-

mental units and to state government through local intergovernmental monitoring and management of socioeconomic impact, through development of land use policies which support improved management of energy use, through strengthening of local energy conservation programs, and by improving the base for local decisions (such as comprehensive plans and budgets) affecting future energy consumption.

H. Taxation of Electric Generation

A few brief general observations will help to set an frame of reference for the specific taxation situations at Hanford and Roosevelt. Federal generation facilities are, of course, not subject to state or local taxation, and direct sale of federally generated power to a private industry is not covered by state statutes. If federal generation is purchased by a municipal or private utility and resold to an industry however, it is subject to state taxation. While power which is federally generated in-state and exported out-of-state is not taxed, non-federal generation which is exported is subject to state business and occupation tax (B & O tax) on the gross receipts from out-of-state sale whether by private or public utility.

Generation facilities, which are owned by or ownership is shared by a private utility, are subject to valuation by the Department of Revenue of the state. The facility valuation is established as a share of the total valuation of the company in the state. The county levies property taxes against the valuation set by the state. The valuation of the facilities may be annually increased during construction progress with the result that some local revenue is generated during construction.

Generation facilities, which are owned or ownership shared by a public utility district, are subject to a state PUD privilege tax as a substitute for the property tax levied against private facilities. The state retains 4% of the tax and remits 96% to the county in which the plant subject to the tax is located. The tax is applied to the kilowatt-hours of energy

generated, and therefore produces no local revenue during plant construction nor during plant shutdown. This tax also applies to a joint operating agency such as the Washington Public Power Supply System except that the WPPSS Hanford Generating Project (N Plant) is exempt. The county commissioners are required to apportion at least 35% of this tax to the school districts in the county. Cities are authorized to negotiate payments directly to counties where they own or share ownership of generation facilities.

Sales/use taxes are applied to construction of all facilities regardless of ownership. A county may levy 0.5% tax for county revenue, and an additional 0.3% may be levied in support of local public transit service. The fuel used in thermal plant operation (nuclear, coal, oil) is subject to the same sales or use taxes during plant operation, except that the steam supply for the Hanford Generating Plant is not subject to this tax. For revenue to the state general fund all utilities--city, public utility district, coop, and private--are subject to a tax of 3.6% of gross retail sales in the state.

The Washington State statutory provisions for taxation of electric generation facilities are summarized in Table 1 with its accompanying footnotes.

Table 2 summarizes partial estimates of the sales/use taxes generated by the four WPPSS plants at Hanford (three under construction and one in operation). These plants are solely JOA owned and therefore subject only to the taxes shown in the joint operating agencies column of Table 1. The

TABLE 1

ELECTRIC GENERATION FACILITIES IN WASHINGTON STATE

Summary of Taxability: C on plant construction, O on plant operation

Taxes and Agencies Receiving	Federal Installations (Hydroelectric)	Public Utility Districts(1)	City Electric Utilities(2)	Joint Operating Agencies(3)	Investor Owned Utilities(4)	BARS Account Numbers(5)
Property Tax(6)						
State for schools	- -	- -	- -	- -	C, O	
County	- -	- -	- -	- -	C, O	311.10
Privilege or In-lieu Tax						
State	- -	O 4%(7)	- -	O(9)	- -	
County	- -	O 96%(7)	O(8)	O(9)	- -	335.20
Business and Occupation Tax						
State	C	C, O(10)	C, O(10)	C, O(10)	C, O(10)	
County(11)	- -	- - -	- -	- -	- -	- -
Sales and Use Taxes						
State 4.5%(12)	C(15)	C	C	C, O(16)	C, O(16)	
County 0.5%(13)	C(15)	C	C	C, O(16)	C, O(16)	313.10
Public Transit(14)	C(15)	C	C	C, O(16)	C, O(16)	313.20
Public Utility Tax						
State 3.6%(17)	- -	O	O	- -(18)	O	
County(11)	- -	- -	- -	- -	- -	- -

(Footnotes on next page)

TABLE 1 (continued)

FOOTNOTES:

(1) PUD electric energy RCW 54.16.040
(2) Cities and towns RCW 35.92.050 and 35A.80.020
(3) JOA formation RCW 43.52.360, tax liability RCW 43.52.460
(4) State assessment RCW 84.12.270
(5) State Auditor's Budgeting - Accounting - Reporting System RCW 43.09.200
(6) Real property RCW 84.04.090; personal property RCW 84.04.080
(7) RCW 54.28.020 and RCW 54.28.050
(8) RCW 35.21.420, 35.21.422, and 35.21.425
(9) RCW 54.28.020 except that Hanford N Reactor steam plant is exempt by RCW 43.52.460
(10) RCW 82.04.110 Manufacturer and RCW 82.04.240 Tax on Manufacturers apply 0.44% tax on gross receipts gained by the utility from export of self-generated electric power (cf. RCW 82.16.050(6) and (9)) which is exempt from Public Utility Tax
(11) The B & O and utility taxes are not authorized for counties
(12) State sales tax RCW 82.08 and use tax RCW 82.12 (4.6% 6/1/76 to 6/30/77)
(13) County sales and use taxes RCW 36.42 and 82.14
(14) Sales and use tax for public transportation RCW 82.14.045 may be 0.1%, 0.2%, or 0.3%
(15) On federal construction the sales tax applies to both labor and materials according to RCW 82.04.190 amended May 1975 and 82.12.010 amended July 1975 but contested by the U. S. Government
(16) O represents primarily sales or use taxes on fuel used as operating energy source
(17) RCW 82.16.010(5) and .020(1) tax on retail power sales, except export power sales (RCW 82.16.050(9))
(18) JOA not subject to 3.6% public utility tax which is collected on in-state sales by JOA participants

NOTE:

Because of the site criteria for the location of new electric generation facilities, cities and towns will not receive direct revenue benefits from any of the tabulated utility taxes on either plant construction or plant operation. The PUD privilege tax (RCW 54.28) applies to sales as well as generation, and the public utility tax (RCW 82.16) actually relates only to sales and not to generation.

TABLE 2

PARTIAL ESTIMATE OF SALES/USE TAXES PAID ON

WPPSS PLANTS AT HANFORD

Period	N Plant (1)	WNP-1 (2)	WNP-2(2)	WNP-4(2)	Benton County Share (3)
1975:					
First Quarter	- -	- -	$ 755,000	- -	$ 75,500
Second Quarter	- -	- -	1,630,000	- -	163,000
Third Quarter	- -	- -	2,785,000	- -	278,500
Fourth Quarter	- -	34,000	1,685,000	- -	171,900
TOTAL	- -	34,000	6,855,000	- -	688,900
1976:					
First Quarter	- -	57,000	1,420,000	- -	147,700
Second Quarter	- -	451,000	1,870,000	285,000	260,600
Third Quarter	- -	959,000	693,600	908,000	254,700
Fourth Quarter	- -	1,325,000	1,101,600	978,000	338,300
TOTAL	- -	2,792,000	5,085,200	2,171,000	1,001,300

Footnotes:

(1) WPPSS paid ERDA in 1975 for energy in the form of steam charges and supplemental payments in the amount of $22,500,000 and in 1976 the sum of $18,500,000. These payments are not subject to use tax because they are considered payments for a service which is not identified in the statute as a taxable retail service.

(2) These figures are estimates derived from construction progress reports. They do not include purchase of equipment by WPPSS.

(3) The Tri Cities and Franklin County do not share in sales and use taxes generated by the plants.

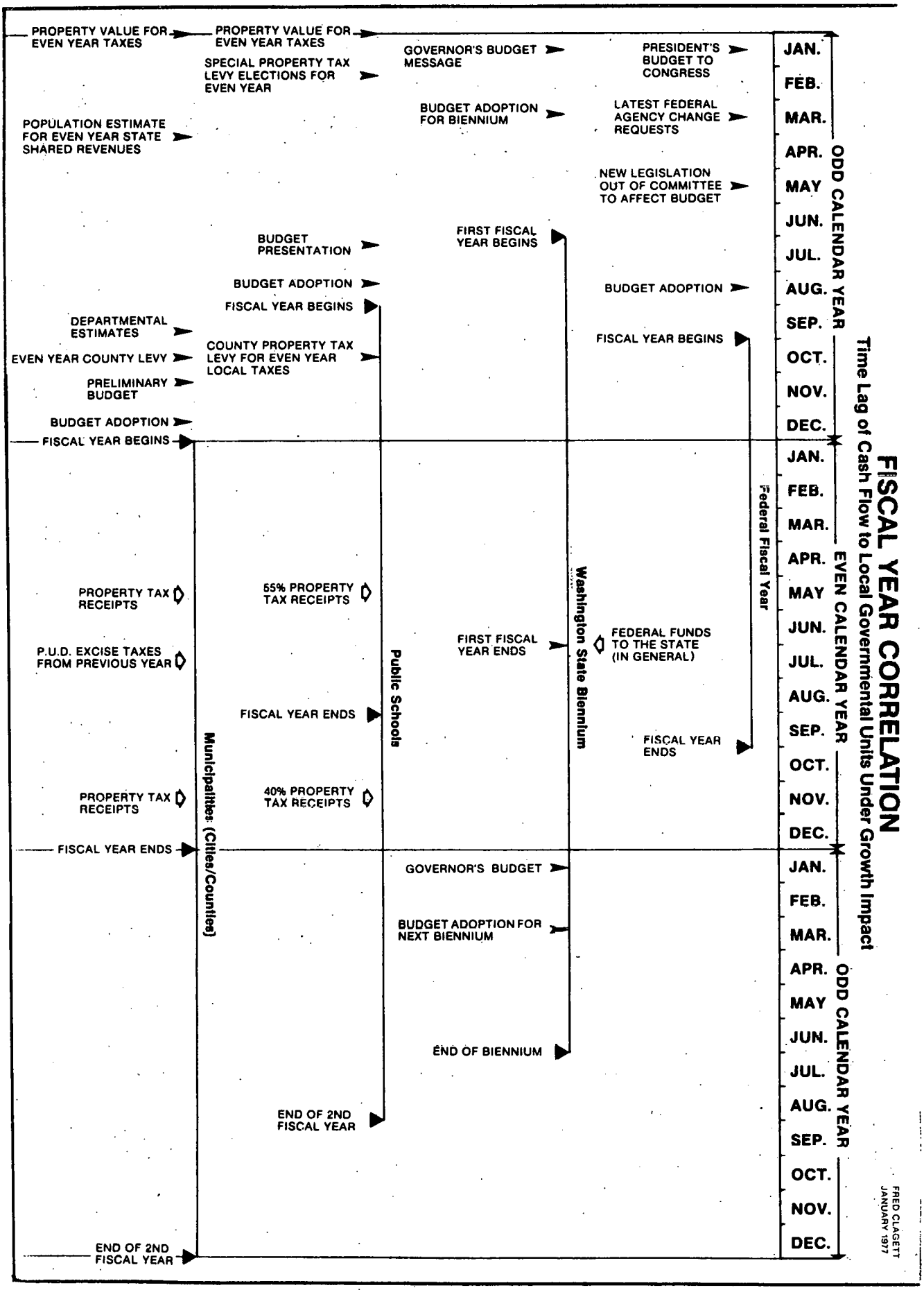
energy center at Roosevelt is proposed by Pacific Power & Light Co., and would be subject to the investor owned utilities column of Table 1. If the center at Roosevelt or new plants at Hanford involved mixed utility ownerships (as at other Northwest sites), then more than one column of Table 1 would apply.

The figures in Table 2 are incomplete estimates only to give an indication of the current experience at Hanford including the apparent difficulty of accurate county designation of the local 0.5% sales tax paid by over one hundred plant contractors who also do business across the rest of the state. For 1974 the Department of Revenue reported $277 million dollars of undesignated retail sales (2.1% of the total) based on the 0.5% local tax. For 1975 the figure rose to $486 million or 3.4% of the total.

Under growth impact of major facility construction it is particularly important that the local revenue system reflect:

1. Equity of local revenues in relation to impact.
2. Adequacy of local revenues in relation to impact.
3. Timing of local revenues in relation to time of impact. (See Figure 1)
4. Projection of local revenues in relation to projected local impacts for reliable budget planning.
5. Provision of adequate socioeconomic monitoring and reporting for regular and timely adjustment of local government operations.

Short falls in achieving these objectives are readily apparent. There is serious need for tax base sharing of potential local revenues from both


FISCAL YEAR CORRELATION
Time Lag of Cash Flow to Local Governmental Units Under Growth Impact
PROPERTY VALUE FOR EVEN YEAR TAXES
PROPERTY VALUE FOR EVEN YEAR TAXES
SPECIAL PROPERTY TAX LEVY ELECTIONS FOR EVEN YEAR
POPULATION ESTIMATE FOR EVEN YEAR STATE SHARED REVENUES
GOVERNOR'S BUDGET MESSAGE
BUDGET ADOPTION FOR BIENNIUM
PRESIDENT'S BUDGET TO CONGRESS
LATEST FEDERAL AGENCY CHANGE REQUESTS
NEW LEGISLATION OUT OF COMMITTEE TO AFFECT BUDGET
BUDGET PRESENTATION
BUDGET ADOPTION
FISCAL YEAR BEGINS
DEPARTMENTAL ESTIMATES
EVEN YEAR COUNTY LEVY
PRELIMINARY BUDGET
BUDGET ADOPTION
FISCAL YEAR BEGINS
COUNTY PROPERTY TAX LEVY FOR EVEN YEAR LOCAL TAXES
FIRST FISCAL YEAR BEGINS
BUDGET ADOPTION
FISCAL YEAR BEGINS
ODD CALENDAR YEAR
JAN.
FEB.
MAR.
APR.
MAY
JUN.
JUL.
AUG.
SEP.
OCT.
NOV.
DEC.
EVEN CALENDAR YEAR
PROPERTY TAX RECEIPTS
P.U.D. EXCISE TAXES FROM PREVIOUS YEAR
PROPERTY TAX RECEIPTS
FISCAL YEAR ENDS
55% PROPERTY TAX RECEIPTS
FISCAL YEAR ENDS
40% PROPERTY TAX RECEIPTS
FIRST FISCAL YEAR ENDS
FEDERAL FUNDS TO THE STATE (IN GENERAL)
FISCAL YEAR ENDS
Municipalities: (Cities/Counties)
Public Schools
Washington State Biennium
Federal Fiscal Year
GOVERNOR'S BUDGET
BUDGET ADOPTION FOR NEXT BIENNIUM
END OF BIENNIUM
END OF 2ND FISCAL YEAR
END OF 2ND FISCAL YEAR
ODD CALENDAR YEAR
FRED CLAGETT JANUARY 1977

construction and operation of such highly concentrated capital projects as multiple thermal power plants. Site certification requirement can only provide a part of the answer, and lack of adequate resolution of the problem presents a barrier to timely completion of approval sites.

I. Hanford as an Energy Center

Hanford has had a favorable early history as an energy center candidate. It has had nine production reactors operation on once through cooling. Local population was acquired to operate the reactors and supporting facilities on what has been a secured reservation. The local population was directly involved in the early development of the area as a site for thermal power plants as all but one of the production reactors were shut down. Distance from load centers was probably the major initial obstacle.

The last operating production reactor is supplying steam to the 860 megawatt WPPSS Nuclear Generating Project. Generation began in 1966 and the current steam contract with the Energy Research and Development Administration runs to 1983. Payments for steam began in 1971 and are currently running on the order of $22.5 million per year for 4.5 billion kilowatt-hours generation. Under the contract payments are expected to rise to a rate of $34 million in 1979 and about $45 million in 1983 for both steam and supplementary payments for the sames annual generation.

The Hanford Generating Project (N Plant) was placed in operation before the state siting statute was adopted. The following sequence of Hanford site applications was initially related to recognition that sooner or later the federal government would shut down the N Reactor operation for federal purposes and by-product steam would no longer be available. The Washington Public Power Supply System first evaluated operation of the federal reactor as an energy source only, then evaluated providing a new steam supply for

the existing turbine generator plant. Application was made to the state for additional generation, WNP-2, which was certified in 1972. After extensive study WPPSS decided to provide next to WNP-2 a replacement plant (WNP-1) to be on-line by the time the Hanford Generating Project would be shut down by cessation of federal reactor operation. Projected growth dictated another plant, WNP-4 be included with the application for WNP-1 filed with the state in May 1974.

This sequence of events raised with the state siting council the question of evaluating the cumulative effects of adding plants to a site which had already been approved but for one plant only. The incremental approach raised questions of ultimate carrying capacity for which an evaluation was not provided at that point. Some indication of ultimate development could particularly provide a better basis for local and state planning relative to mitigation of the impact of the project development on the surrounding area.

Socioeconomic analysis of the WNP-1 and WNP-4 impact on the area became available only just before the final days of hearing. In the initial hearing neither the local council of governments (COG) nor its members appeared to testify, and local units of government did not have time to analyze the socioeconomic projection before the final state hearing was closed. Since then the school districts have negotiated an agreement with WPPSS under the certification conditions noted above. Other general and specific purpose municipalities are in the process of negotiation with WPPSS separately from the school districts, except that Bneton County has

dropped out of the intergovernmental planning because of the tax benefits it will receive both from construction and operation.

J. Roosevelt Energy Center

Under different circumstances the Roosevelt energy center site was approached by the applicant from the opposite direction from the Hanford site. Specifically the applicant proposed utilization of the "study of potential sites" sections of the state siting statute with a request to evaluate the maximum physical carrying capacity for coal and nuclear fueled units. The request was made on the basis of physical limitations under existing pollution control statutes and the actual conditions at the site.

Potential socioeconomic impacts from the development of the site were expressly omitted from the applicant request and concurred in by the state siting council. The studies were completed by the council in the summer of 1976 with the result that the applicant decided in the fall to pick up purchase options held on four to five thousand acres of land bordering the Columbia River. The applicant has made no announcement of plans or schedule for use of the site. While the studies reported the feasibility of locating multiple units at the site, there is no commitment on the part of either the applicant or the state to proceed with the site for development.

K. Socioeconomic Research Needs

Much current effort has been going in recent years into socioeconomic analysis of the impact of major developments. This interest has been spurred by such factors as the accelerated impact of larger and larger developments over shorter periods of time, recognition of the fact that growth may in fact increase the per capita costs of governmental services and therefore the tax burden, that major development in rural areas separated from urban support may strain to the breaking point the capacity of government to respond.

Analysis of socioeconomic impacts on the human environment is supported in Washington by the requirements of the State Environmental Policy Act.

Experience over particulary the last five years suggests the need for additional research in the following general areas:

> Impact analysis and management particularly with reference to possible socioeconomic criteria for siting, impact monitoring and translation to local government planning and decision making, and secondary impact analysis.
>
> Tax dollar flow particularly with reference to projection of amounts, timing, and direction in relation to anticipated impacts for both construction and operation.
>
> Models and methods for tax base sharing.
>
> Improved processes for coordination between local and state planning and decision making.
>
> Interstate regional structures for better governmental policy response to problems of management of energy demand and supply, regional plant siting, and interstate impact issues.

Intergration of environmental statement requirements with site application requirements.

Determination of effective roles for substate regional councils of government in support of local government partnership in energy policy development.

Determination of feasibility and means for effective use of public transit for movement of construction workers by public transit to reduce energy consumption, traffic, and road construction costs; this may involve the issue of evolving new union contract provisions relative to transportation.

L. Bibliography

I. ENERGY RESOURCE PLANNING

BPA PARTICIPATION IN REGIONAL INTER-UTILITY COOPERATION - DRAFT ENVIRONMENTAL STATEMENT. Portland, OR: Bonneville Power Administration, April 1, 1975.

BPA PROPOSED RATE INCREASE: IMPACT STUDY. Portland, OR: Bonneville Power Administration, November 1973.

BPA WHOLESALE POWER RATE INCREASE - FINAL ENVIRONMENTAL STATEMENT, Portland, OR: Bonneville Power Administration, August 15, 1974.

ELECTRIC ENERGY PICTURE IN THE PACIFIC NORTHWEST, Portland, OR: Bonneville Power Administration, April 1973.

THE ENERGY PICTURE IN THE PACIFIC NORTHWEST. Portland, OR: Bonneville Power Administration, September 1975.

Erickson, Lee E. REGIONAL ANALYSIS OF THE U.S. ELECTRIC POWER INDUSTRY, Volume 3, REGIONAL DEMAND ANALYSIS AND CONSUMPTION FORECASTS. Richland, WA: BATTELLE, Pacific Northwest Laboratory, 1975.

FEDERAL HYDROELECTRIC PLANTS CAN INCREASE POWER SALES - DEPARTMENT OF THE INTERIOR. Report to Congress by the Comptroller General of the United States. July 8, 1976.

Higgins, Gary H. ANALYSIS OF SUPPLY-DEMAND ELECTRICITY FOR THE TWELVE WESTERN STATES, 1973-1990. Lakewood, CO: Western Interstate Nuclear Board, May 7, 1976.

LONG RANGE PROJECTION OF POWER LOADS AND RESOURCES FOR THERMAL PLANNING, WEST GROUP AREA, 1976-1977 THROUGH 1995-1996, INCLUDING UTILITY SUMMARIES AND SUPPORTING DATA. Portland, OR: Pacific Northwest Utilities Conference Committee, Subcommittee on Loads and Resources. (Annual Blue Book) April 16, 1976.

Mangan, John F. PUMPED STORAGE DEVELOPMENTS IN THE PACIFIC NORTHWEST. Pumped Storage Development and its Environmental Effects (Proceedings Series No. 15), American Water Resources Association, Urbana, Illinois, pp. 459-64, 1971.

POWER AREAS IN THE PACIFIC NORTHWEST. Vancouver, WA: Columbia Basin Inter-Agency Committee, Power Planning Subcommittee, November 1962.

POWER GENERATION ALTERNATIVES. Seattle, WA: City of Seattle, Department of Lighting, 1972.

POWER OUTLOOK THROUGH 1986-87. Covers West Group Area of Northwest Power Pool; Portland, OR: Bonneville Power Administration, (Annual) March 1976.

PACIFIC NORTHWEST HYDRO-THERMAL POWER PROGRAM - A REGIONAL APPROACH TO MEETING ELECTRIC POWER REQUIREMENTS. B-114858. A report to the Congress by the Comptroller General of the United States, June 5, 1974.

PUMPED-STORAGE INVENTORY OF THE PACIFIC NORTHWEST: AN INVENTORY OF SITES LOCATED IN WASHINGTON, OREGON, IDAHO, WESTERN MONTANA AND WITHIN THE COLUMBIA RIVER BASIN OF THE UNITED STATES. Report No. 26. Prepared as an element of the Columbia River and Tributary Review Study; Portland, OR: U. S. Army Corps of Engineers, North Pacific Division, January, 1976.

PUMPED-STORAGE POTENTIAL OF THE PACIFIC NORTHWEST, Parts 1 and 2. Prepared by U. S. Army Corps of Engineers, North Pacific Division; Vancouver, WA: Pacific Northwest River Basins, Power Planning Committee, January 1972.

REGIONAL POWER PLANNING-STUDY PAPER. Portland, OR: Bonneville Power Administration, November 11, 1976.

REVIEW OF POWER PLANNING IN THE PACIFIC NORTHWEST CALENDAR YEAR 1975. (Annual). Vancouver, WA: Pacific Northwest River Basins Commission, Power Planning Committee, March 1976.

Tomsic, E.M. and C.D. Brown, PUMPED GENERATING UNITS FOR THE GRAND COULEE PUMPING - GENERATING PLANT, Transactions, Institute of Electrical and Electronic Engineers (Power Apparatus System), May/June 1973.

WEST GROUP FORECAST OF POWER LOADS AND RESOURCES, July 1976 - June 1987. (Annual) Pacific Northwest Utilities Conference Committee, March 1, 1976.

WESTERN STATES ENERGY RESOURCE DEVELOPMENT UPDATE 1976. Prepared by Lawrence E. Wilkinson; Lakewood, Co: Western Interstate Nuclear Board, September 1976.

WESTERN STATES WATER REQUIREMENTS FOR ENERGY DEVELOPMENT TO 1990. Salt Lake City, UT: Western States Water Council, November 1974.

Western Systems Coordinating Council. REPLY TO FEDERAL POWER COMMISSION DOCKET r-362, "RELIABILITY AND ADEQUACY OF ELECTRIC SERVICE", April 1976.

II. ENERGY POLICY DEVELOPMENT
1. West/Northwest

Butcher, Walter and George Hinman. GUIDELINES FOR A NORTHWEST ENERGY POLICY:
PHASE I: REPORT ON ENERGY SUPPLIES, USES, AND ENERGY SURPLUS OR SHORTFALL, December 1973.
PHASE II: ANALYSIS OF ENERGY POLICIES FOR 1980, 1974.
Pullman: Washington State University.

ENERGY AND STATE GOVERNMENT: A DECISION-MAKING SYSTEM DESIGNED TO INTEGRATE SOCIAL, ECONOMIC AND ENVIRONMENTAL PROCESSES. Salem: State of Oregon, Office of Energy Research and Planning, July 1, 1973.

ENERGY DEVELOPMENT IN THE ROCKY MOUNTAIN REGION: GOALS AND CONCERNS. Denver, CO: Federation of Rocky Mountain States, July 1975.

Martin, Dana H. and Thomas W. Frizzell. MONTANA ENERGY POLICY STUDY: Final Report. Helena: State of Montana, Environmental Quality Council, February 12, 1975.

OREGON'S ENERGY FUTURE: FIRST ANNUAL REPORT. Salem: Oregon Department of Energy, January 1, 1977.

Reardon, William A. OREGON ENERGY STUDY: THE ENERGY SITUATION IN OREGON, A BASE CASE. Prepared for the Public Utility Commissioner of Oregon. Richland, WA: Battelle, Pacific Northwest Laboratories, August 1973.

A REGIONAL ANALYSIS: ECONOMIC AND FISCAL IMPACTS OF THE ALUMINUM INDUSTRY IN THE PACIFIC NORTHWEST. Summary report to the Western Aluminum Producers. [San Francisco, CA]: Arthur D. Little, Inc., November 1974.

TRANSITION. Report to the Oregon Energy Council; Salem, OR: Office of the Governor, The Office of Energy Research and Planning, January 1, 1975.

Wilfert, G. L. and M. H. Karr. OREGON ENERGY STUDY: ENVIRONMENTAL AND SOCIAL IMPLICATIONS OF ENERGY UTILIZATION. Prepared for the Public Utility Commissioner of Oregon. Richland, WA: Battelle, Pacific Northwest Laboratories, July 1973.

II. ENERGY POLICY DEVELOPMENT
2. State of Washington

Albaugh, Fred. STUDY OF BASES FOR A WASHINGTON STATE ENERGY OFFICE. Prepared for the Office of the Governor, State of Washington; Richland, WA: Battelle, Pacific Northwest Laboratories, December 1974.

ALTERNATIVES FOR WASHINGTON: ALTERNATIVES ON THE PATHWAY TO 1985: THE COSTS AND HARD CHOICES. Volume I, Report No. 2, Olympia: Washington State Office of Program Planning and Fiscal Management, November 1976.

ALTERNATIVES FOR WASHINGTON: AN AGENDA FOR THE FUTURE. Olympia: Washington State Office of Program Planning and Fiscal Management, January 1977.

ENERGY: PART I: ITS USE IN WASHINGTON STATE - February 1976
PART II: SOURCES FOR WASHINGTON STATE - November 1976
Facts and Issues; Seattle, WA: League of Women Voters of Washington.

ENERGY FACTS AND ASSESSMENTS: A DECLARATION OF DEPENDENCE. Seattle, WA: City of Seattle, February 1974.

ENERGY IN THE STATE OF WASHINGTON. Seattle: State of Washington Energy Policy Council, January 1974.

ENERGY 1990 - INITIAL REPORT; VOL. I, SUMMARY AND OVERVIEW. Seattle: City of Seattle, Department of Lighting, February 1976.

ENERGY POLICY COUNCIL - FINAL REPORT.
VOL. 1 - SUMMARY AND RECOMMENDATIONS
VOL. 2 - FULL TEXT AND RECOMMENDATIONS.
Seattle, WA: State of Washington Energy Policy Council, January 1, 1975.

Eschels, Curtis. THE ENERGY FACILITY SITE EVALUATION COUNCIL. Prepared for the Washington State Senate Energy and Utilities Committee by Curtis Eschels, Staff Member, January 24, 1977.

McCarthy, Joseph L. THE EVOLUTION OF WASHINGTON SITING LEGISLATION, Washington Law Review, Vol. 47:1, pp. 1-8, 1971.

Nadal, Joe. TECHNOLOGY AND SOCIAL CHANGE: THE POLITICS OF POWER PLANT SITING IN THE STATE OF WASHINGTON. Prepared for Professor Kai N. Lee [University of Washington] Spring 1974.

POWER GENERATION ALTERNATIVES. Seattle, WA: City of Seattle, Department of Lighting, 1972.

Schuy, David F. ENERGY COSTS OF USING COLUMBIA RIVER WATER FOR IRRIGATION. EM. 3891. Pullman: Washington State University, January 1975.

SOME ENERGY POLICY OPTIONS AVAILABLE TO THE STATE OF WASHINGTON. Richland, WA: Battelle, Pacific Northwest Laboratories, September 1973.

STATE POLICIES FOR LAND USE AND NATURAL RESOURCE MANAGEMENT. Olympia: State of Washington, Office of the Governor, January 1977.

Whittlesey, Norman K. VALUE OF INSTREAM WATER USE. Prepared for presentation to Washington State House of Representatives. Pullman: Washington State University, January 8, 1976.

III. REGIONAL (INTERSTATE) ORGANIZATION

Bendavid, Avrom. REGIONAL ECONOMIC ANALYSIS FOR PRACTITIONERS. New York, Praeger, 1972.

Derthick, Martha and Gary Bombardier. BETWEEN STATE AND NATION: REGIONAL ORGANIZATIONS OF THE UNITED STATES. Washington DC: The Brookings Institute, 1974.

Garvey, Gerald. COMMUNITY IMPLICATIONS OF ENERGY PARKS: A REGIONAL DEVELOPMENT PERSPECTIVE, in Energy Parks Panel of the National Academy of Public Administration, "Institutional Aspects of the Concept of Energy Parks," unpublished report, pp. 6-106 to 6-178, 1975.

Hansen, Orval. FEDERAL-STATE CONFLICTS AND COOPERATION IN THE SITING OF NUCLEAR ENERGY FACILITIES. Washington, DC: National Academy of Public Administration, Energy Centers Panel, January 1977.

REGIONAL FACTORS IN PLANNING AND SITING ELECTRICAL ENERGY FACILITIES IN THE WESTERN STATES - EXECUTIVE SUMMARY. Prepared by Western Interstate Nuclear Board; Washington, DC: U. S. Nuclear Regulatory Commission, Office of Standards Development, December 15, 1976.

REGIONAL POWER PLANNING - STUDY PAPER. Portland, OR: Bonneville Power Administration, November 11, 1976.

IV. DATA SOURCES

Bourque, Philip J. and Richard S. Conway, Jr. THE INPUT-OUTPUT STRUCTURE OF WASHINGTON STATE. Seattle: University of Washington, February 1976.

Brunton, Thomas and John Brandon. THE IMPACT OF GENERAL REVENUE SHARING ON LOCAL GOVERNMENTS OF THE STATE OF WASHINGTON. Olympia: Washington State Office of Community Development, February 1976.

BUDGET SUGGESTIONS FOR 1977: TOTAL CITY REVENUES - 1977, EXCLUDING UTILITIES (ESTIMATED). Information Bulletin No. 374. Prepared in cooperation with Association of Washington Cities. Seattle: Municipal Research and Services Center of Washington, August 1976.

Corssmit, W.J.M. AN ANALYSIS OF SOCIAL OVERHEAD CAPITAL EXPENDITURES IN THE COLUMBIA BASIN IRRIGATION PROJECT 1950 - 1970. Pullman, WA: Unpublished Ph.D. dissertation on file in Washington State University Library, 252 p., 1973.

Duarte, Arthur Culver, THE ECONOMIC BASE RATIO AS A TOOL OF ANALYSIS FOR SELECTED CITIES ABD COUNTIES IN WASHINGTON. A thesis submitted in partial fulfillment of the requirements for Ph.D. degree. Pullman: Washington State University, c1975.

ECONOMIC FORECAST FOR WASHINGTON STATE, CALENDAR YEARS 1976-1980. Prepared in cooperation with Department of Commerce and Economic Development, Department of Employment Security, Office of Program Planning and Fiscal Management. Olympia, WA: Washington State Department of Revenue, January 1977.

ELECTRICAL ENERGY DATA FOR THE STATES OF WASHINGTON, OREGON AND IDAHO (A COMPENDIUM). Seattle, WA: Federal Energy Administration Region X, Energy Programs and Analysis Division, November 1976.

EMPLOYMENT AND PAYROLLS IN WASHINGTON STATE BY COUNTY AND BY INDUSTRY. Olympia: Washington State Department of Employment Security, quarterly.

EMPLOYMENT NEEDS IN THE CONSTRUCTION INDUSTRY 1975-1985 (by) Eric V. Swanson, Olympia: Washington State Department of Revenue, Research Division, December 1975.

ENERGY RESOURCES OF WASHINGTON. Information Circular No. 50. Olympia: Washington State Department of Natural Resources, Division of Geology and Earth Resources, 1974.

FINANCIAL TRANSACTIONS OF COUNTIES AND TAXING DISTRICTS (Annual). Olympia: Washington State Auditor, December 31, 1974. 1975 edition in press.

Fuglestad, Paul E. TAX TRANSFERS AMONG WASHINGTON COUNTIES IN FISCAL YEAR 1970. Pullman, WA: Unpublished Ph.D. dissertation on file in Washington State University Library, 147 p., 1974.

Hinman, George et al, ENERGY CONSUMPTION IN THE PACIFIC NORTHWEST, 1971. Pullman: Washington State University, Environmental Research Center, April 1974.

AN INVENTORY AND COMPARATIVE ANALYSIS OF EXISTING NATURAL RESOURCE DATA FOR THE TRIDENT PROJECT IMPACT AREA. Prepared by Haworth and Anderson, Inc., Olympia: Washington State Office of Community Development (June 1976).

LABOR AREA SUMMARY. Olympia: Washington State Department of Employment Security, monthly.

LABOR FORCE AND EMPLOYMENT IN WASHINGTON STATE. Olympia: Washington State Department of Employment Security, annual.

LOCAL GOVERNMENT COMPARATIVE STATISTICS. Annual BARS report. 1973, 2 Vols. (first issue); 1974, 1 Vol.; 1975, in press. Olympia: Washington State Auditor.

Monma, Clyde, et al. ENERGY DATA FOR THE PACIFIC NORTHWEST, rev. ed. Pullman: Washington State University, 1974.

1975 DATA AND STATISTICS. Twenty-two public utility districts in Washington. Seattle, WA: R. W. Beck and Associates for the Washington Public Utility Districts' Association. Annual. (November 1976).

1975 PROPERTY TAX COLLECTIONS AND LEVIES DUE IN 1976. Annual. Olympia: Washington State Auditor and Washington State Department of Revenue. (First issue in press).

1975 TAX REFERENCE MANUAL: THE STATE-LOCAL TAX SYSTEM IN WASHINGTON STATE. Olympia, WA: Washington State Department of Revenue, [December 1974].

OREGON'S ENERGY FUTURE: FIRST ANNUAL REPORT. Salem: Oregon Department of Energy, January 1, 1977.

POCKET DATA BOOK 1976 (Annual). Olympia: State of Washington, Office of Program Planning and Fiscal Management, December 1976.

POPULATION TRENDS - STATE OF WASHINGTON. Olympia: Washington State Office of Program Planning and Fiscal Management, August 1976.

REPORT OF FINANCIAL TRANSACTIONS OF SCHOOL DISTRICTS. (Annual) Olympia: Washington State Auditor (for fiscal year ending) June 30, 1975.

A REPORT ON TAX BASE SHARING. Olympia: Washington State Office of Community Development. June 1976.

THE RESEARCH COUNCIL'S HANDBOOK: A COMPENDIUM OF STATISTICAL AND EXPLANATORY INFORMATION ABOUT STATE AND LOCAL GOVERNMENT IN WASHINGTON. 4th Ed. - Olympia: Washington State Research Council, c1976.

Looseleaf publication, supplemented periodically.

Romer, Henry F., Steven H. Flajser, Celeste H. Martin. ENERGY PROFILE IN THE STATE OF WASHINGTON, Seattle: University of Washington, Institute for Environmental Studies, July 1973.

WASHINGTON STATE POPULATION FORECASTS 1975 TO 2000. Prepared for use in the 1977-79 biennium long range capital facility plan; Olympia: Washington State Office of Program Planning and Fiscal Management, Population Studies Division, December 1975.

V. SITE STUDIES
1. Hanford

APPLICATION FOR CERTIFICATION FOR WPPSS NUCLEAR PROJECT NO. 1. Before the State of Washington Thermal Power Plant Site Evaluation Council; Richland: Washington Public Power Supply System, (May 21, 1974).

Clement, Marvin et al. STUDY AND FORECAST OF TRI-CITY ECONOMIC ACTIVITY AND ITS RELATED IMPACT ON GASOLINE NEEDS AND HOUSING. Richland, WA: Battelle, Pacific Northwest Laboratories, May 1974.

CONSTRUCTION IMPACT STUDY. NO. 1 WORK PAPERS - June 30, 1976. No. 2 FORECASTING RELATIONSHIPS AND DEMOGRAPHIC FORECASTS - July 29, 1976. NO. 3 FINAL REPORT - September 20, 1976. Impacts of WNP-1, 2 and 4 projects on governmental entities in the Tri-Cities Area; Seattle, WA: Naramore, Bain, Brady & Johanson, Management Consulting Services/The Planning Group.

CONTINUED OPERATION OF THE HANFORD GENERATING PROJECT - FINAL ENVIRONMENTAL IMPACT STATEMENT. Richland: Washington Public Power Supply System, January 1977.

THE CURRENT HOUSING SITUATION: RICHLAND, KENNEWICK, PASCO, WASHINGTON, HOUSING MARKET AREA AS OF JUNE 1, 1974. Washington, DC: U. S. Department of Housing and Urban Development, October 1974.

ECONOMIC BASE STUDY. Prepared for the Benton Regional Planning Commission and the Department of Commerce and Economic Development, State of Washington; San Francisco, CA: EBASCO Services Incorporated, (October 1963).

ENVIRONMENTAL CONSIDERATIONS (SEPA) RELATED TO THE PROPOSED WASHINGTON PUBLIC POWER SUPPLY SYSTEM'S PROPOSED NUCLEAR PROJECT NO. 1 [adjacent to N Reactor]. Richland, WA: The Supply System, February 5, 1973.

ENVIRONMENTAL CONSIDERATIONS (SEPA) OF HANFORD NO. 2 NUCLEAR POWER PLANT. Richland: Washington Public Power Supply System. Issued January 7, 1972. Supplemented March 24, 1972.

ENVIRONMENTAL STATEMENT (FINAL) RELATED TO THE PROPOSED HANFORD NUMBER TWO NUCLEAR POWER PLANT, WASHINGTON PUBLIC POWER SUPPLY SYSTEM. Washington DC: U. S. Atomic Energy Commission, Directorate of Licensing, December 1972.

ENVIRONMENTAL STATEMENT (FINAL) RELATED TO CONSTRUCTION OF WASHINGTON PUBLIC POWER SUPPLY SYSTEM NUCLEAR PROJECTS 1 and 4. NUREG 75/012. Washington, DC: U. S. Nuclear Regulatory Commission, Office of Nuclear Regulation, March 1975.

FURTHERANCE OF WPPSS NUCLEAR PROJECTS NOS. 4 and 5 - FINAL ENVIRONMENTAL IMPACT STATEMENT SUPPLEMENT:
APPENDIX I: INPUT BY PUD NO. 1 OF BENTON COUNTY;
APPENDIX IX: INPUT BY PUD NO. 1 OF FRANKLIN COUNTY:
APPENDIX XIX: INPUT BY CITY OF RICHLAND. Richland, WA: Washington Public Power Supply System, April 1976.

THE HANFORD NUCLEAR ENERGY CENTER: 1. AN INTERIM CONCEPTUAL STUDY. BNWL-B-458. October 1975. 2. AN INTERIM CONCEPTUAL STUDY. BNWL-B-45811. November 1976. Prepared for U. S. Energy Research and Development Administration; Richland, WA: Battelle, Pacific Northwest Laboratories.

HORSE HEAVEN HILLS IRRIGATION AND DEVELOPMENT POTENTIAL; Section 6: Power Development. Pullman: Washington State University, College of Agriculture, December 1970.

LOCATION OF WPPSS NUCLEAR PROJECT NO. 4 ADJACENT TO WPPSS NUCLEAR PROJECT NO. 1 - ENVIRONMENTAL IMPACT STATEMENT. Richland: Washington Public Power Supply System, July 1974.

MANAGEMENT SYSTEM DEVELOPMENT PROJECT: AN EVALUATION: POLICY PLANNING, DECISION MAKING, AND PROGRAM OPERATION. Prepared by Marshall Kaplan, Gans and Kahn; Richland, WA: Benton Franklin Governmental Conference, June 1975.

Myllenbeck, Wesley L., Ronald C. Cease, and Michael F. Rosenberger. APPROACHES TO LOCAL GOVERNMENT REORGANIZATION: TRI-CITIES, WASHINGTON. Prepared by Columbian Research Institute; Richland, WA: Benton-Franklin Governmental Conference, November 1970.

NUCLEAR PROJECT NO. 1 - ENVIRONMENTAL IMPACT STATEMENT. Richland: Washington Public Power Supply System, April 1974.

REPORT ON SURVEY OF REVENUE POTENTIAL AND SERVICE CONSOLIDATION (Tri-Cities Area). Seattle, WA: Harry J. Prior & Associates, Inc., April 15, 1975.

SITE CERTIFICATION AGREEMENT BETWEEN THE STATE OF WASHINGTON AND WASHINGTON PUBLIC POWER SUPPLY SYSTEM FOR HANFORD NO. 2 NUCLEAR ELECTRIC GENERATING FACILITY. Olympia: State of Washington, Thermal Power Plant Site Evaluation Council, May 17, 1972.

SITE CERTIFICATION AGREEMENT FOR WPPSS NUCLEAR PROJECTS NO. 1 AND NO. 4 BETWEEN THE STATE OF WASHINGTON AND THE WASHINGTON PUBLIC POWER SUPPLY SYSTEM. Olympia: State of Washington, Thermal Power Plant Site Evaluation Council, August 8, 1975.

SOCIO-ECONOMIC IMPACT STUDY WPPSS 1 and 4, Vol. 1: FIRST PROGRESS REPORT (Reporting Period August 8, 1975 to May 31, 1976). Prepared by Community Development Services, Inc.; Richland: Washington Public Power Supply System, October 1976.

SOCIO-ECONOMIC STUDY: WPPSS NUCLEAR PROJECT 1 and 4. Two volumes prepared by Woodward-Clyde; Richland: Washington Public Power Supply System, April 1975.

Tilse, Frances E. THE HIGHWAY SYSTEM AND THE IMPACT OF POPULATION AND INDUSTRIAL GROWTH IN A CHANGING ECONOMY - STATE OF WASHINGTON. Chapter V. The Tri-Cities Region. Olympia: State of Washington, Joint Committee on Highways, November 1968.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM (WPPSS) PROJECTS WNP-1 AND WNP-4: ENVIRONMENTAL IMPACT STATEMENT. Olympia: State of Washington, Thermal Power Plant Site Evaluation Council, Draft March 1975, Final Supplement June 1975.

Wilfert, G. L. and J. R. Young, IMPACT OF A MAJOR CONSTRUCTION PROJECT ON AN ISOLATED MEDIUM SIZED COMMUNITY, Proceedings, pp. 21-32, Thermal Power Conference, conducted by Washington State University and Northwest River Basins Commissions, Pullman, Washington, October 24, 1974.

Wilfert, G. L., E. E. Yandon, and J. R. Young, ECONOMIC IMPACT OF A HANFORD ENRICHMENT COMPLEX. Richland, WA: Battelle, Pacific Northwest Laboratories, September 1973.

V. SITE STUDIES
2. Roosevelt

AIR QUALITY ASPECTS OF THE PROPOSED ENERGY CENTER AT WEST ROOSEVELT WASHINGTON. Prepared by North American Weather Consultants; Olympia: State of Washington, Thermal Power Plant Site Evaluation Council, April 1976.

GEOTECHNICAL STUDIES FOR PRELIMINARY EVALUATION OF A PROPOSED NUCLEAR POWER PLANT SITE AT WEST ROOSEVELT, WASHINGTON. Prepared by Shannon & Wilson to Woodward-Envicon, Inc., Portland, OR: Pacific Power & Light Co., November 1974.

POWER PLANT SITE EVALUATION. Provided by Woodward-Clyde Consultants; Portland, OR: Pacific Power & Light Co., March 1, 1976. (Three sites, including West Roosevelt).

PRELIMINARY ENVIRONMENTAL ASSESSMENT: PACIFIC POWER AND LIGHT COMPANY'S PROPOSED ENERGY CENTER AT WEST ROOSEVELT, WASHINGTON. Prepared by Dames and Moore, Consultants in the Applied Earth and Environmental Sciences; Olympia: State of Washington, Energy Facility Site Evaluation Council, May 1976.

SLOPE STABILITY STUDIES-COLUMBIA RIVER ESCARPMENT-WEST ROOSEVELT, WASHINGTON. Volume I - REPORT, Volume II - APPENDICES. Prepared by Shannon and Wilson, Inc., Portland, OR: Pacific Power & Light, February 1976.

Stiles, Jack T. ROOSEVELT ENERGY CENTER. Unpublished presentation to Washington Thermal Power Plant Site Evaluation Council at Olympia, Washington; Portland, OR: Pacific Power & Light Company, June 9, 1975.

WEST ROOSEVELT SITING STUDY. Prepared by Stone & Webster Engineering Corp.; Portland, OR: Pacific Power & Light Co., [1973].

V. SITE STUDIES
3. Skagit

APPLICATION FOR SITE CERTIFICATION FOR THE SKAGIT NUCLEAR POWER PROJECT BEFORE THE STATE OF WASHINGTON POWER PLANT SITE EVALUATION COUNCIL. Bellevue, WA: Puget Sound Power & Light Company, [March 28, 1974].

ENVIRONMENTAL IMPACT STATEMENT: ZONING AMENDMENT FOR BACUS HILL AREA, PUGET SOUND POWER & LIGHT COMPANY. Prepared by Community Development Services, Inc. (Seattle); Mount Vernon, WA: Skagit County Board of Commissioners and Skagit County Planning Commission, February 19, 1974.

ENVIRONMENTAL REPORT, SKAGIT NUCLEAR POWER PROJECT. Prepared in conjunction with proposal to site a nuclear power project in Skagit County near the town of Lyman, Washington; Bellevue, WA: Puget Sound Power & Light Company, October 12, 1973.

ENVIRONMENTAL STATEMENT, DRAFT SUPPLEMENT TO THE FINAL, RELATED TO CONSTRUCTION OF SKAGIT NUCLEAR POWER PROJECT UNITS 1 and 2, PUGET SOUND POWER & LIGHT COMPANY, et al. NUREG-0089. Washington, DC: United States Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, July 1976.

ENVIRONMENTAL STATEMENT, FINAL, RELATED TO CONSTRUCTION OF SKAGIT NUCLEAR POWER PROJECT UNITS 1 AND 2, PUGET SOUND POWER & LIGHT COMPANY, et al. NUREG-75/055. Washington, DC: United States Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, May 1975.

ENVIRONMENTAL STATEMENT, FINAL, SKAGIT PROJECT 1 AND 2. [Prepared by Mathematical Sciences Northwest, Incorporated], Olympia: State of Washington Thermal Power Plant Site Evaluation Council, November 1975.

Finnegan, W. J. INSTITUTIONAL ASPECTS OF THERMAL POWER PLANT CONSTRUCTION, Proceedings, pp. 33-52, Thermal Power Conference, conducted by Washington State University and Northwest River Basins Commission, Pullman, Washington, October 2-4, 1974.

Myhra, David. BOOMTOWN PLANNING: EXAMPLES OF SUCCESSFUL APPLICATIONS AT NUCLEAR POWER PLANT AND WESTERN COAL MINING SITES. Presented at 57th Annual Conference, "Planning 75: Innovation and Action", American Institute of Planners, San Antonio, Texas; Pittsburgh, PA: Westinghouse Electric Corporation, [1975]. Skagit site pp. 8-15.

Schofield, R. C. PROJECTED SOCIAL AND ECONOMIC PROBLEMS RESULTING FROM THE CONSTRUCTION AND OPERATION OF THE SKAGIT NUCLEAR PROJECT AS SEEN BY A LOCAL GOVERNMENT AGENCY, Proceedings, pp. 15-20, Thermal Power Conference conducted by Washington State University and Pacific Northwest River Basins Commission, Pullman, Washington, October 2-4, 1974.

SITE CERTIFICATION AGREEMENT FOR SKAGIT NUCLEAR POWER PROJECT UNITS 1 AND 2 BETWEEN THE STATE OF WASHINGTON AND PUGET SOUND POWER & LIGHT COMPANY. Olympia, WA: Energy Facility Site Evaluation Council, January 5, 1977.

V. SITE STUDIES
4. Satsop

APPLICATION FOR CERTIFICATION FOR WPPSS NUCLEAR PROJECT NO. 3 BEFORE THE STATE OF WASHINGTON THERMAL POWER PLANT SITE EVALUATION COUNCIL. Richland, WA: Washington Public Power Supply System, [December 17, 1973].

ENVIRONMENTAL CONDITIONS, STATEMENT [SEPA - FINAL] ON NUCLEAR PROJECT NO. 3. Richland, WA: Washington Public Power Supply System, June 1973.

ENVIRONMENTAL IMPACT STATEMENT ON LOCATION OF WPPSS NUCLEAR PROJECT NO. 5 ADJACENT TO WPPSS NUCLEAR PROJECT NO. 3. Richland, WA: Washington Public Power Supply System, July 1974.

ENVIRONMENTAL IMPACT STATEMENT ON WNP-3 AND WNP-5, SATSOP, WASHINGTON, Draft Supplement. Prepared by Tippetts-Abbett-McCarthy-Stratton. Olympia: State of Washington Thermal Power Plant Site Evaluation Council, April 1975.

ENVIRONMENTAL REPORT [AMENDMENT NO. 4 TO THE U. S. NUCLEAR REGULATORY COMMISSION] WPPSS NUCLEAR PROJECT NO. 3 [AND NO. 5]. Richland, WA: Washington Public Power Supply System, May 1975.

ENVIRONMENTAL STATEMENT, FINAL, RELATED TO CONSTRUCTION OF WASHINGTON PUBLIC POWER SUPPLY SYSTEM PROJECTS 3 AND 5. NUREG-75/053. Washington, DC: Unites States Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, June 1975.

FACILITY LOCATION EVALUATION FOR SATSOP INTEGRATING TRANSMISSION. Supplement to the Environmental Statement, Fiscal Year 1976 Proposed Program. Portland, OR: Department of the Interior, Bonneville Power Administration, 1975.

SITE CERTIFICATION AGREEMENT FOR WPPSS NUCLEAR PROJECTS NO. 3 AND NO. 5 (WNP 3 AND 5) BETWEEN THE STATE OF WASHINGTON AND THE WASHINGTON PUBLIC POWER SUPPLY SYSTEM. Olympia: State of Washington Energy Facility Site Evaluation Council, October 27, 1976.

SOCIO-ECONOMIC EFFECTS OF CONSTRUCTION AND OPERATION OF WNP-3 and WNP-5 AND ALTERNATIVES TO ALLEVIATE ADVERSE EFFECTS. Prepared by Westinghouse Electric Corporation; Richalnd, WA: Washington Public Power Supply System, December 1974.

SOCIOECONOMIC IMPACT OF WNP-3 AND WNP-5. Prepared by Community Development Services; Richland: Washington Public Power Supply System, Sept. 1975

☆U.S. GOVERNMENT PRINTING OFFICE: 1977-240-979/68